AIA25

Window Code Fundamentals

000WCF23

Thursday, June 5th, 1-2 pm

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AIA25 Conference on Architecture & Design

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Window Code Fundamentals

Accessibility, Egress, Fall Protection, and Safety Glazing

Introductions

Presenter

Headshot photo here

Todd Geil

Architectural Consultant

Bio

ANDERSEN® WINDOWS & DOORS

Course / Learning Objectives

- Ascertain the different elements of accessibility codes for windows
- Identify emergency escape and rescue regulations, as well as exceptions to the rules
- Describe the window fall protection requirements in the 2024 International Residential Code (IRC) and the 2024 International Building Code (IBC)
- Distinguish when and where safety glazing is required for windows

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ANDERSEN® WINDOWS & DOORS

Section 1

Window Accessibility Codes

Accessibility Code Background

FEDERAL LAWS

Federal Fair Housing Act

- Passed in 1963
- 1988 enacted in disability amendments
- Enforced by Department of Housing and Urban Development (HUD)

Americans with Disabilities Act (ADA)

- Passed by Congress in 1990
- Enforced by Department of Justice (DOJ)

ICC (or ANSI) A117.1 – Standard for Accessible and Usable Buildings and Facilities

- Enables both federally enforced laws to be incorporated into the building codes
- The 2009 version of ICC A117.1 is referenced in the 2018 IBC
- The 2017 version of ICC A117.1 is referenced in the 2021 and 2024 IBC

Section 101 Purpose:
"The intent of these sections is to allow a person with a physical disability to independently get to, enter, and use a site, facility, building, or element."

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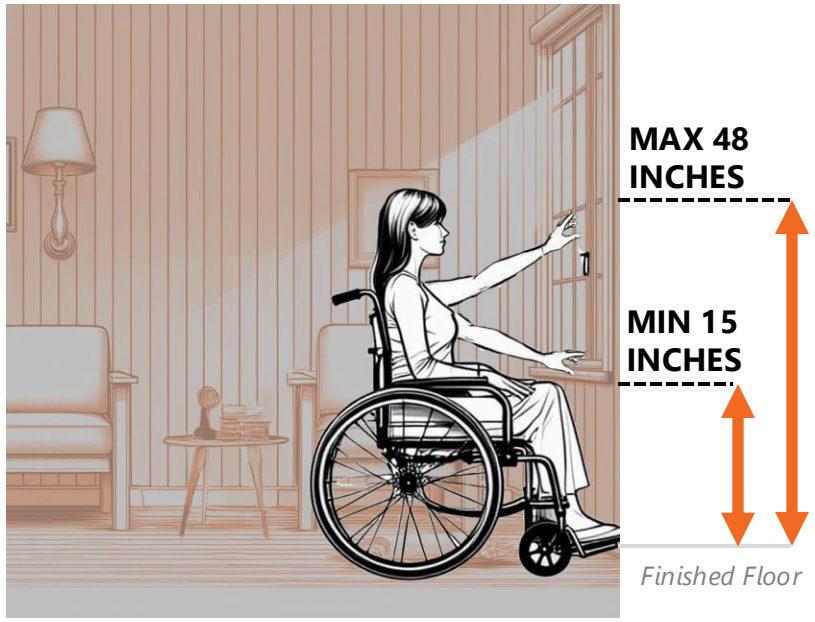
Unobstructed Reach of Operable Parts of a Window

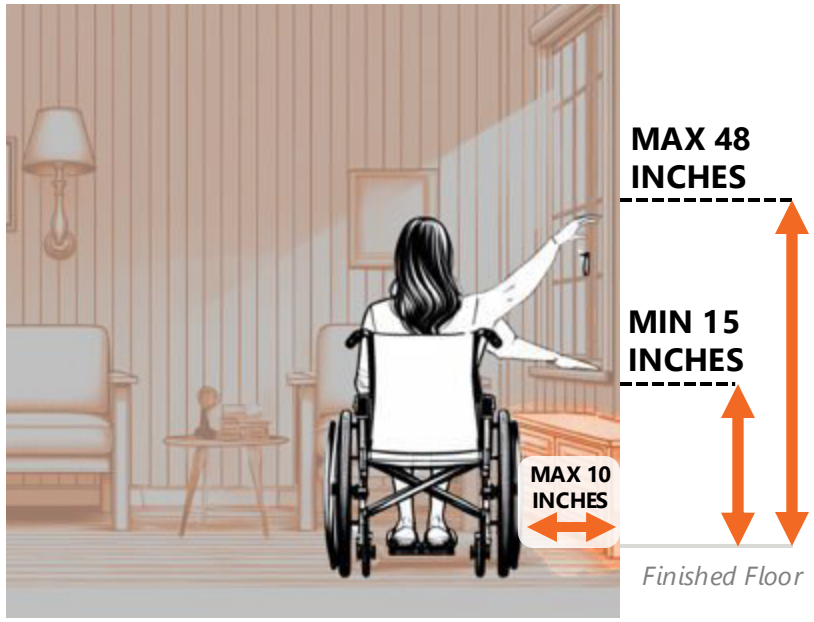
ICC A117.1: Section 308:

Believed to apply to operable parts such as window hardware.

UNOBSTRUCTED FORWARD REACH



SIDE REACH



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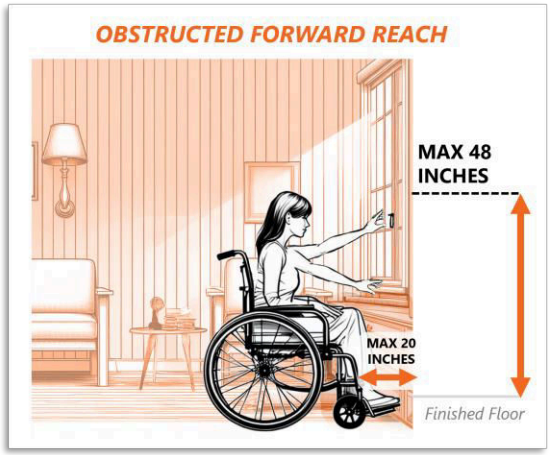

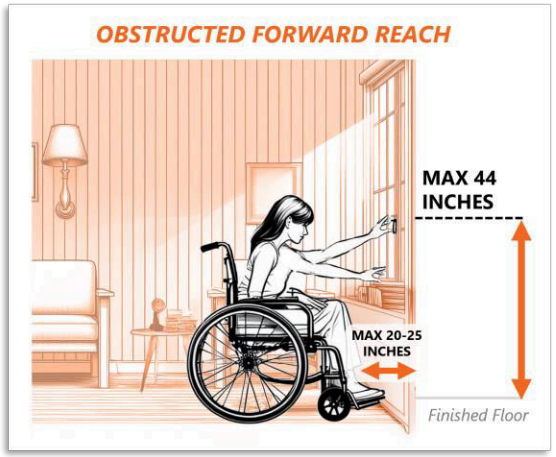

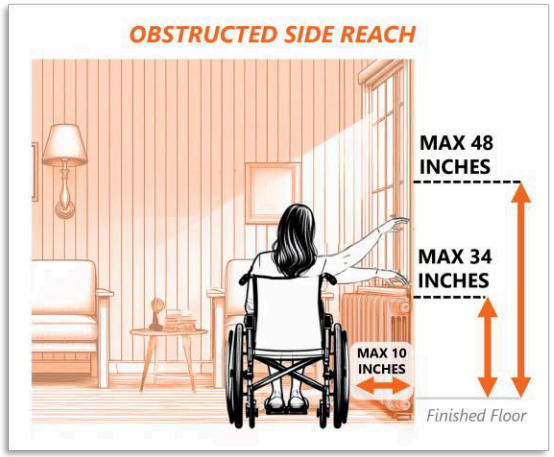

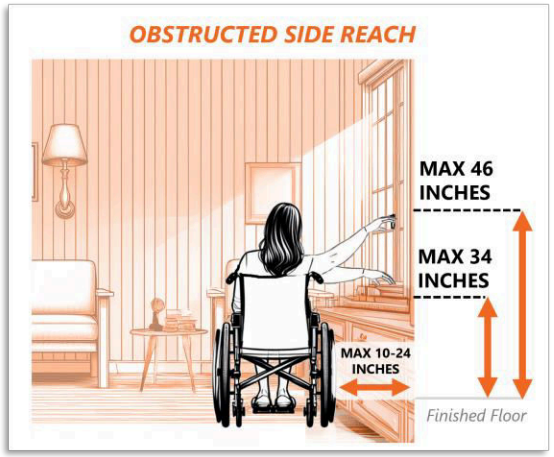

Obstructions will decrease the maximum reach range.

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Operable Parts of a Window Must Be Accessible

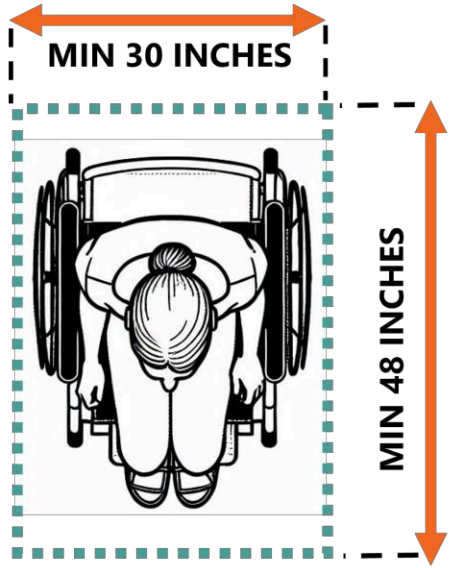
2010 ADAAG Section 229.1 General: Where glazed openings are provided in *accessible* rooms or *spaces* for operation by occupants, at least one opening shall comply with 309. Each glazed opening required by an *administrative authority* to be operable shall comply with 309.

Exceptions:

1. Glazed openings in *residential dwelling units* required to comply with 809 shall not be required to comply with 229.
2. Glazed openings in quest rooms required to provide communication features and in guest rooms required to comply with 206.5.3 shall not be required to comply with 229

ICC A117.1 Section 309:

- Clear floor space 30" x 48"
- Height within reach ranges
- Operable with one hand and shall not require tight grasping, pinching or twisting of the wrist
- Force required to activate operable parts shall be 5.0 lbs. maximum



** ADAAG – Americans with Disabilities Act Accessibilities Guidelines*

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More About Operable Parts Requirements and Testing

2024 International Building Code:

The 2024 IBC references the 2017 version of ICC A117.1, wherein a testing standard for operational force, AAMA 513-14, is now referenced.

ICC A117.1-2017, SECTION 506: WINDOWS

506.1 General. Where operable windows are provided in an accessible room or space, at least one shall comply with Section 506. Where operable windows are required to provide natural ventilation or operable windows are required to provide an emergency escape and rescue opening, that window shall be the operable window that complies with Section 506.

Exceptions:

1. Operable windows that are operated only by employees shall not be required to comply with this section.
2. Operable windows in Type A units that comply with Section 1103.13.
3. Operable skylights shall not be required to comply with this section.

**New for 2017*

Operating Force Tests for Operable Window Parts

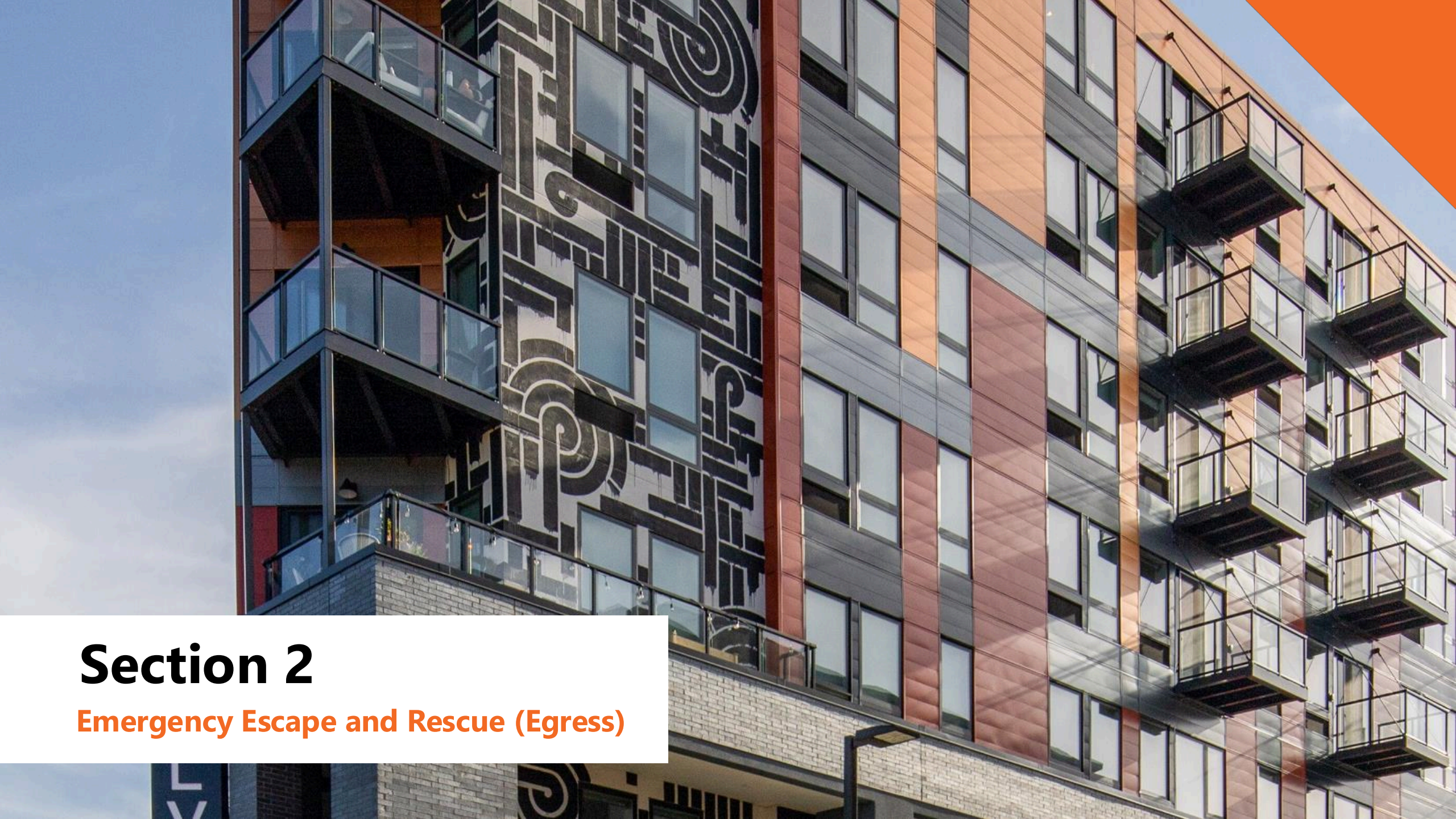
ICC A117.1-2017: 506.2 Operating force: The operating force for windows includes forces for opening, closing, locking or latching, and unlocking or unlatching and shall be determined in accordance with AAMA 513 listed in Section 106.2.13. Operable parts for locking or latching and unlocking or unlatching shall comply with Section 309. The operating force for opening and closing operable windows shall be as follows:

1. 8.5 pounds (37.7 N) maximum for vertical or horizontal sliding windows.
2. 5 pounds (22.2N) maximum for all other types of operating windows.

Details of Note:

- Section 506.2 references 106.2.13 of AAMA 513.
- The actual standard for testing operable parts is AAMA 513 Section 106.2.11

AAMA 513-14 106.2.11 Standard Laboratory Test Method for Determination of Forces and Motions Required to Activate Operable Parts of Operable Windows and Doors in Accessible Spaces.



Section 2

Emergency Escape and Rescue (Egress)

Egress Background

Escape

- Bedrooms: Fires begin when occupants are sleeping and may block normal path to exit
- Basement: Fires can block stairs

Rescue

- Allow enough space for **firefighter access** with full equipment

History

- Dimensions based on study by San Diego Building and Fire Departments.
- From late 1960's – early 1970's requirement was for a 22" x 22" minimum opening at 5.0 SF
- Current dimensions since 1976

IRC vs. IBC Requirements

2024 International Building Code (IBC) Section 1031

- Residential occupancies are the same requirements as IRC
- Applicable below the 4th story
- Occupancy Groups R-2 (stories with one exit or access to only one exit), R-3 & R-4

2024 International Residential Code (IRC) Section R319

- Basements and sleeping rooms
- Minimum net clear width 20”
- Minimum net clear height 24”
- Minimum net clear opening area 5.7 SF

Exception: The minimum net clear opening for grade floor emergency escape and rescue openings shall be 5 square feet.

- 44” maximum from the bottom of the clear opening to the floor
- Operate without special tools or knowledge

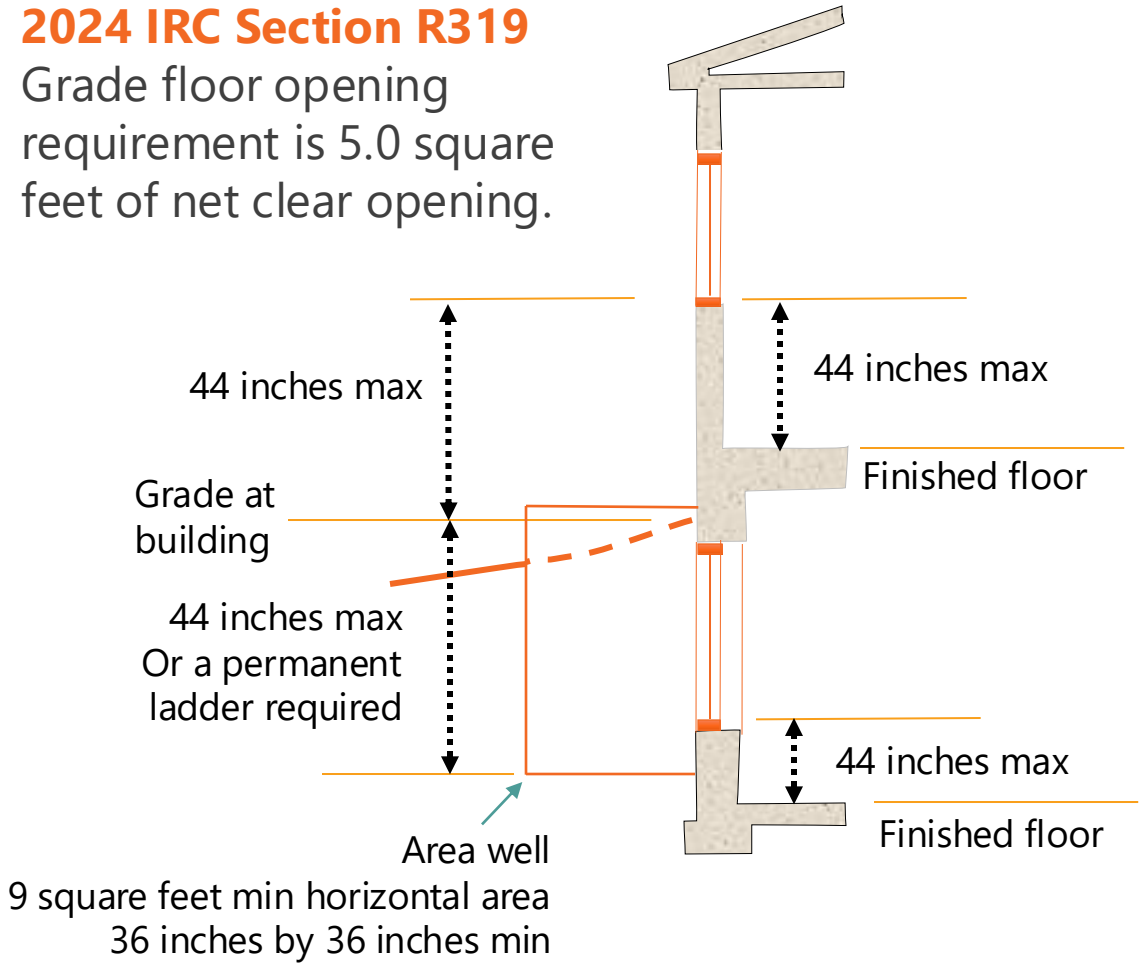
State amendments can vary. Always check with local code official.

Grade Floor Opening

IRC Definitions	
Grade	The finished ground level adjoining the building at all exterior walls.
Grade floor emergency escape and rescue opening	An emergency escape and rescue opening located such that the bottom of the clear opening is not more than 44 inches (1118 mm) above or below the finished ground level adjacent to the opening. (See also "*Emergency escape and rescue opening*.")
Emergency escape and rescue opening	An operable exterior window, door or other similar device that provides for a means of escape and access for rescue in the event of an emergency. (See also "*Grade floor emergency escape and rescue opening*.")

2024 IRC Section R319

Grade floor opening requirement is 5.0 square feet of net clear opening.



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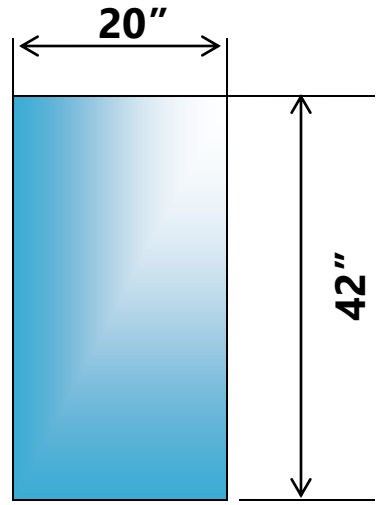
Dimensional Requirements for Net Clear Opening Area

IMPORTANT: Minimum sizes do NOT provide minimum net clear opening area

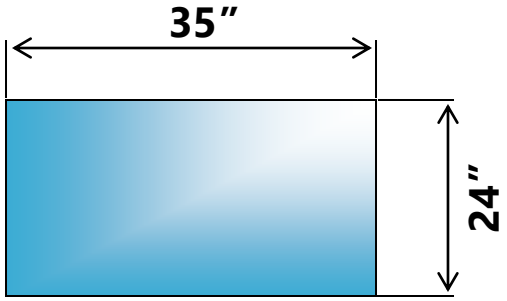
20” (minimum net clear opening width requirement)

x 24” (minimum net clear opening height requirement)

= 3.3 square feet which is **less than the minimum net clear opening area** requirement of 5.7 square feet (for other than a grade floor opening)



20” W x 42” H = 5.7 SF



35” W x 24” H = 5.7 SF

Clear Opening Dimensions: If one of the minimum net clear opening dimension is used, the other dimension must well exceed the minimum to meet the net clear opening area requirement of 5.7 square feet.

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2024 IRC Section R319 Exceptions

Exceptions

- *Basements* housing only mechanical equipment of 200 square feet or less
- *Storm shelters* constructed in accordance with **ICC 500**.
- Sleeping rooms in basements if *dwelling* or *townhouse* is equipped with a compliant automatic sprinkler system (Section P2904) provided:
  - One means of egress complying with Section R318 and one emergency escape and rescue opening, **or**
  - Two means of egress complying with Section R318
- A yard shall not be required to open directly into a public way where the yard opens to an unobstructed path from the yard to the public way. Such path shall have a width of not less than 36 inches.

Section R318: Means of Egress in the IRC

Section P2904: Dwelling Unit ~~Fire~~ Automatic Sprinkler Systems

**New for 2024 IRC*

Newer Section on Replacement Windows

Started as Appendix J – Existing Buildings in the 2015 IRC and was added to Section R310.2.5 Replacement Windows in the 2018 IRC* and 2018 IEBC and retained in the 2021 IRC.

2024 R319.5 Replacement windows for emergency escape and rescue openings: Replacement windows installed in buildings meeting the scope of this code shall be exempt from Sections R310.2 and R310.4.4, provided that the replacement window meets the following conditions:

1. The replacement window is the manufacturer's largest standard size window that will fit within the existing frame or existing rough opening. The replacement window ~~is~~ shall be permitted to be of the same operating style as the existing window or a style that provides for an equal or greater window opening area than the existing window.

2. The replacement window is not part of a change of occupancy.

Note: 2024 IRC relies on R319.5. These provisions are also in the 2024 International Existing Building Code (IEBC).

Section R319.2 covers all the minimum opening dimensions and maximum sill height.
Section R319.4.4 covers bars, grilles, covers and screens

New for 2024 IRC

State amendments can vary. Always check with local code official.

Window Opening Control Devices

New Section in the 2024 IRC: Section R319.5.1

R319.5.1 Window opening control device and fall protection device height: Window opening control devices or fall protection devices shall be located at a height in accordance with **Section R319.1.1** or at as low a height as the device can be installed within the existing clear opening.

R319.1.1 Operational constraints and opening control devices: *Emergency escape and rescue openings* shall be operational from the inside of the room without the use of keys, tools or special knowledge. Window opening control devices and fall prevention devices complying with **ASTM F2090** shall be permitted for use on windows serving as a required *emergency escape and rescue opening* and shall be not more than 70 inches (178 cm) above the finished floor.

Section R319.2: Minimum opening dimensions and maximum sill height.
Section R319.4.4: Bars, grilles, covers and screens

**New for 2024 IRC*

Note: These provisions are also in the 2024 International Existing Building Code (IEBC).

State amendments can vary. Always check with local code official.

IBC Emergency Escape and Rescue

2012 IBC Changes retained in 2015, 2018, 2021 & 2024 IBC

- R-2 and R-3 occupancies are required to have one emergency escape and rescue window in each sleeping room below the 4th story above grade plane, even with an automatic sprinkler system
- R-4 Occupancies added in the 2018 IBC and retained in 2021 and 2024 IBC

Applies to basements and sleeping rooms below the fourth story:

- Group R-2 occupancies located in stories with only one exit or access to only one exit permitted per IRC exit tables
- R-3 and R-4 occupancies requires at least one opening to comply

IBC R (Residential) Occupancies*

Group R-1: Transient residential occupancies like hotels and motels.

Group R-2: Residential occupancies with more than two dwelling units, such as apartments and dormitories, where occupants are primarily permanent.

Group R-3: Buildings with two or fewer dwelling units, adult and child care facilities accommodating five or fewer persons for less than 24 hours, and congregate living facilities with 16 or fewer occupants.

Group R-4: Residential occupancies with 5 to 16 occupants receiving custodial care in a supervised environment.

* *Summarized occupancy definitions. See Chapter 3 of the 2024 IBC for full definitions.*

2024 IBC Exceptions

1. *Basements* with a ceiling height of less than 80 inches (2032 mm) shall not be required to have *emergency escape and rescue openings*.
2. *Emergency escape and rescue openings* are not required from *basements* or sleeping rooms that have an *exit* door or *exit access* door that opens directly into a *public way* or to a *yard*, *court* or exterior exit balcony that ~~opens~~ leads to a *public way*.
3. *Basements* without *habitable spaces* and having not more than 200 square feet (18.6 m^2) in floor area shall not be required to have *emergency escape and rescue openings*.
4. *Storm shelters* are not required to comply with this section where the shelter is constructed in accordance with ICC 500.
5. Within individual *dwelling* and *sleeping units* in Groups R-2 and R-3, where the building is equipped throughout with an *automatic sprinkler system* installed in accordance with Section 903.3.1.1, 903.3.1.2 or 903.3.1.3, *sleeping rooms* in basements shall not be required to have *emergency escape and rescue openings* provided that the basement has one of the following:
   - 5.1. One *means of egress* and one *emergency escape and rescue opening*.
   - 5.2. Two *means of egress*.

Section 903: Automatic Fire Sprinklers

Exception 4 was new in the 2021 IBC and retained in the 2024 IBC

New in 2024 IBC

Section 3

Window Fall Protection

Fall Protection Requirements

- Intended to protecting accidental child falls from open windows by specifying a minimum sill height from finished floor to lowest window opening
- Introduced in 2006 and retained with each new version of IRC/IBC
- Kicks in when the lowest portion of the window opening is greater than 72" from exterior finished grade or surface below **AND** a minimum sill height dimension from the finished floor to the lowest portion of the window opening is not met
- Common minimum sill height dimension is 24 inches in the IRC and 36 inches for R2 and R3 Occupancies in the IBC. (Note: The 36-inch sill height in the IBC started with the 2012 IBC)

Exceptions to the sill height may be allowed where the sash is limited to a less than 4" opening or where a window fall prevention device that complies with ASTM F2090 is installed.

ASTM: American Society of Testing and Materials

**State adoptions can vary ranging from removal of this code section to more stringent requirements.*

Residential Fall Protection Requirements

2024 IRC Code Section R321.2.1 Window Fall Protection

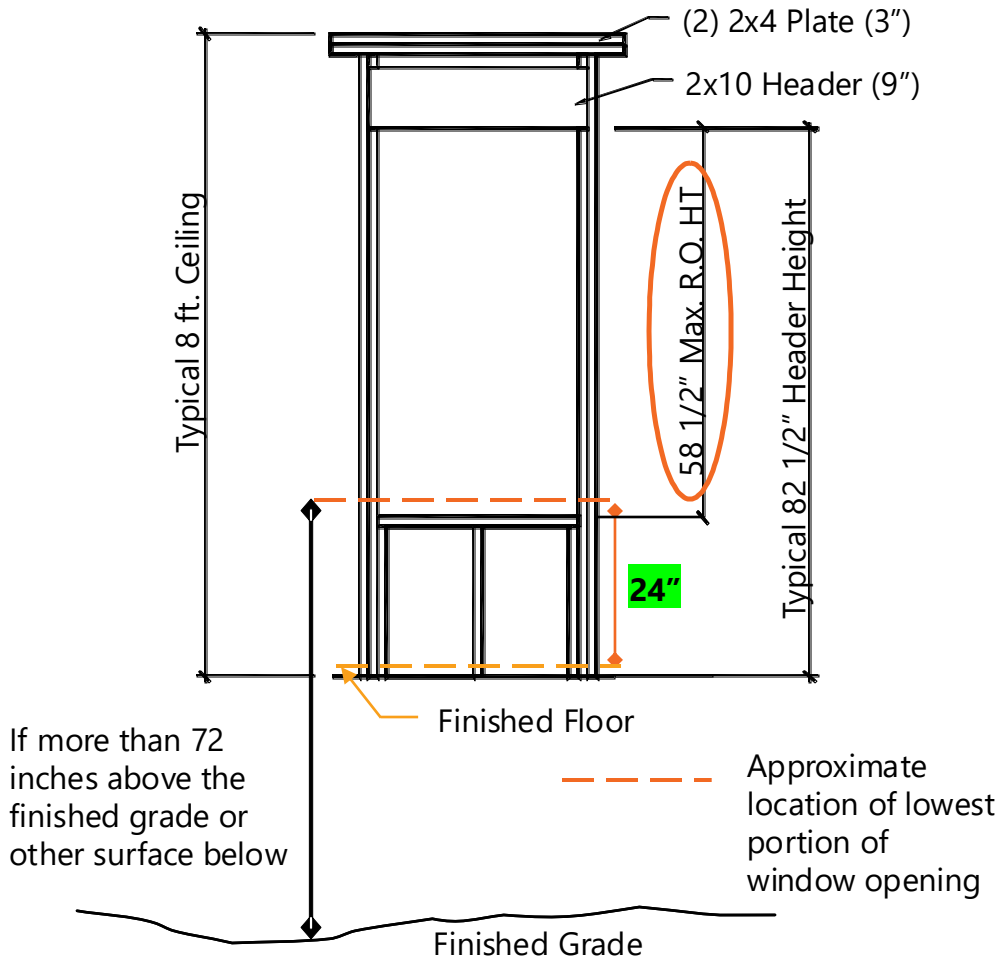
R321.2.1 Window opening height: In dwelling units, where the bottom of the clear opening of an operable window opening is located less than 24 inches (610 mm) above the finished floor and greater than 72 inches (1829 mm) above the finished grade or other surface below on the exterior of the building, the operable window shall comply with one of the following:

1. Operable window openings will not allow a 4- inch-diameter (102 mm) sphere to pass through where the openings are in their largest opened position.
2. Operable windows are provided with window opening control devices or fall prevention devices that comply with ASTM F2090.

Applies to buildings under the scope of the IRC:

- 1 & 2 Family Dwellings
- Townhomes no more than 3 stories in height

The 2024 IRC requirements are unchanged from the 2021 IRC, except for a section number update.



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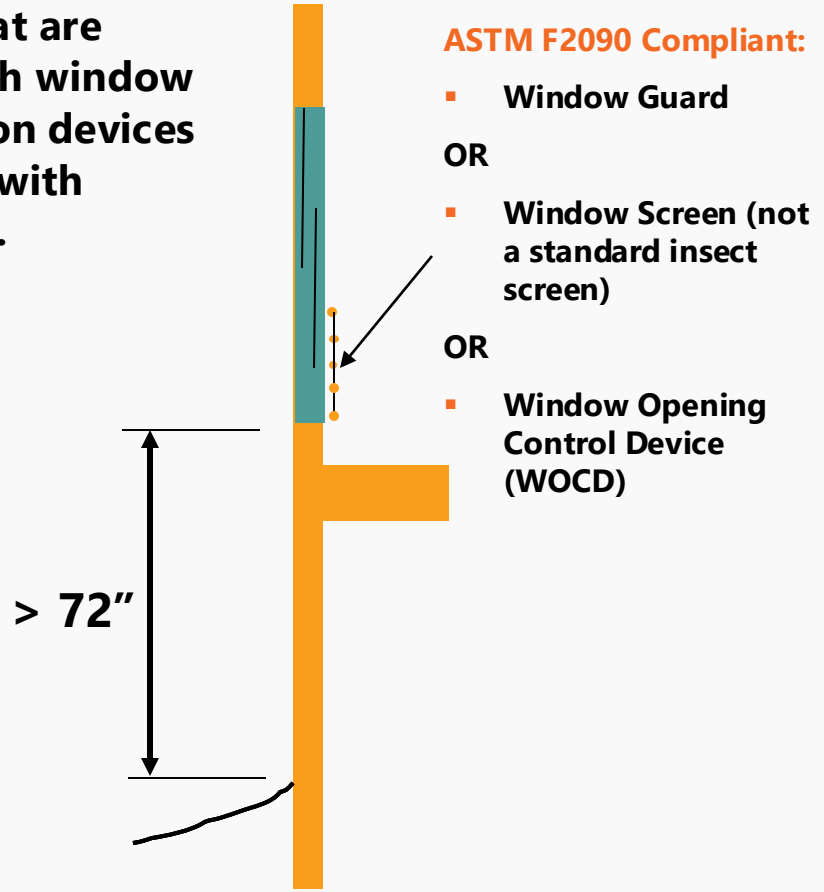
Residential Fall Protection Requirements

If the minimum sill height is not met, one of these two options are required:

Openings that are provided with window fall prevention devices that comply with ASTM F2090.



ASTM F2090 Compliant:

- **Window Guard**

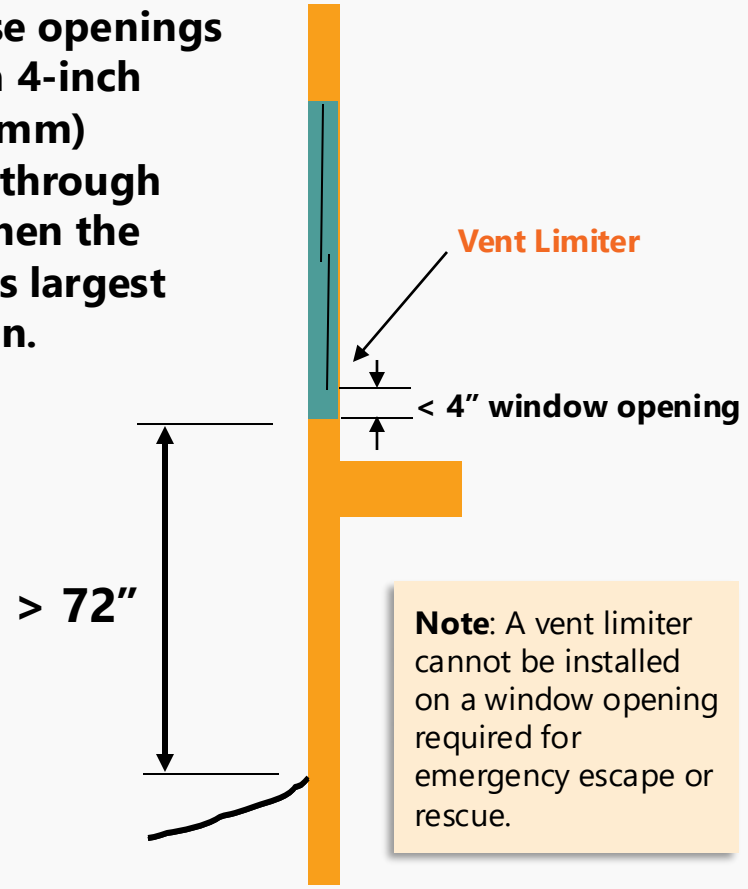
OR

- **Window Screen (not a standard insect screen)**

OR

- **Window Opening Control Device (WOCD)**

Windows whose openings will not allow a 4-inch diameter (102 mm) sphere to pass through the opening when the opening is in its largest opened position.



Note: A vent limiter cannot be installed on a window opening required for emergency escape or rescue.

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ASTM F2090: Specification for Window Fall Prevention Devices with Emergency Escape (Egress) Release Mechanisms

IBC Fall Protection Requirements

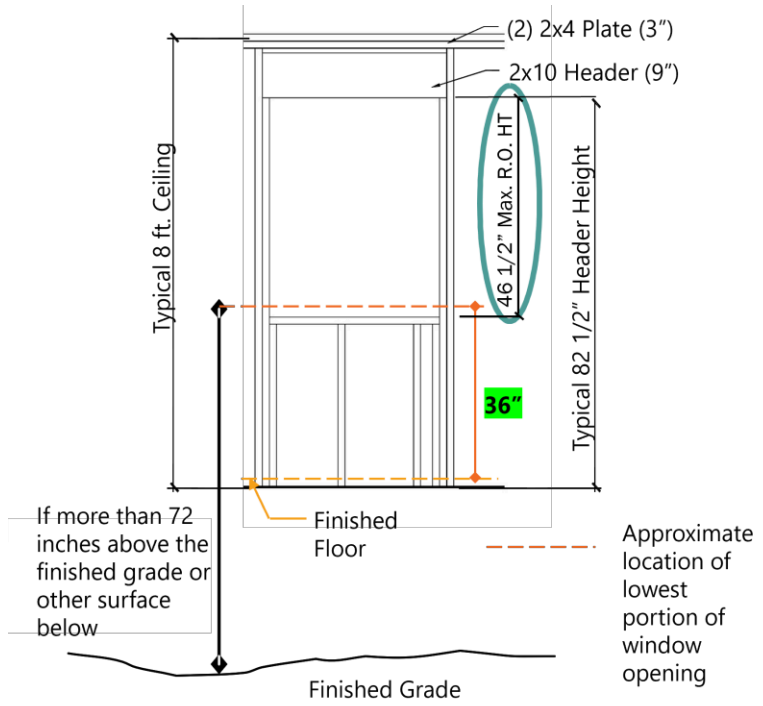
2021 IBC Section 1015.8: Window openings. Windows in Group R-2 and R-3 buildings including *dwelling units*, where the bottom of the clear opening of an operable window is located less than 36 inches (914 mm) above the finished floor and more than 72 inches (1829 mm) above the finished grade or other surface below on the exterior of the building, shall comply with one of the following:

1. Operable windows where the top of the sill of the opening is located more than 75 feet (22 860 mm) above the finished grade or other surface below and that are provided with window fall prevention devices that comply with ASTM F2006.
2. Operable windows where the openings will not allow a 4-inch-diameter (102 mm) sphere to pass through the opening when the window is in its largest opened position.
3. Operable windows where the openings are provided with window fall prevention devices that comply with ASTM F2090.
4. Operable windows that are provided with window opening control devices that comply with Section 1015.8.1.

IBC R (Residential) Occupancies

Group R-2: Residential occupancies with more than two dwelling units, such as apartments and dormitories, where occupants are primarily permanent.

Group R-3: Buildings with two or fewer dwelling units, adult and child care facilities accommodating five or fewer persons for less than 24 hours, and congregate living facilities with 16 or fewer occupants.



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IBC Fall Protection Requirements: WOCDs

2021 IBC Section 1015.8.1 Window opening control devices: Window opening control devices shall comply with ASTM F2090. The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by Section 1031.3.1.

ASTM: American Society of Testing and Materials

IBC 2024 Project Scenario: Fall Protection for Apartment

- New construction, six-story apartment
- Story six is 80 feet above the street level
- Non-egress windows open fully

What kind of fall protection measures would make the <u>non-egress</u> windows compliant on the 6th floor?

WOCDs OR **FIXED WINDOW GUARD** OR **VENT LIMITERS** OR **SPECIAL SCREENS**

Always check with the local code official or other authorities for guidance specific to your project.

IBC 2024 Project Scenario: Fall Protection for Apartment

- New construction, six-story apartment
- Story six is 80 feet above the street level
- Non-egress windows open fully

What kind of fall protection measures would make the <u>non-egress</u> windows compliant on the 6th floor?

ALL ARE OPTIONS BUT NEED CLOSE REVIEW → **IBC 1015.8 Window Openings**

Always check with the local code official or other authorities for guidance specific to your project.

IBC Fall Protection Requirements

2024 IBC Code Section 1015.8 Window Openings

1. ~~Operable windows where the top of the sill of the opening is located more than 75 feet (22 860 mm) above the finished grade or other surface below and that are provided with window fall prevention devices that comply with ASTM F2006.~~Where the bottom of the clear opening of the window is located more than 72 inches (1829 mm) and less than 75 feet (22 860 mm) above the finished grade or other surface below on the exterior of the *building*, the window shall comply with one of the following:

~~2.~~1.1. Operable windows where the openings will not allow a 4-inch-diameter (102 mm) sphere to pass through the opening when the window is in its largest opened position, provided that the opening is not required for emergency escape or rescue.

~~3.~~1.2. Operable windows where the openings are provided with window fall prevention devices that comply with **ASTM F2090**.

~~4.~~1.3. Operable windows where the openings ~~that~~ are provided with window opening control devices that comply with ~~Section 1015.8.1.~~**ASTM F2090**. The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by **Section 1031.3.1** for *emergency escape and rescue openings* .

Where the bottom of the clear opening of the window is located 75 feet (22,860 mm) or more above the finished grade or other surface below on the exterior of the *building* , the window shall comply with one of the following:

Operable windows where the openings are provided with window fall prevention devices that comply with **ASTM F2090**.

Operable windows where the openings will not allow a 4-inch-diameter (102 mm) sphere to pass through the opening when the window is in its largest opened position.

2.3. Window fall prevention devices that comply with **ASTM F2006**.

~~**1015.8.1 Window opening control devices.** Window opening control devices shall comply with ASTM F2090. The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by Section 1031.3.1.~~

New to 2024 IBC.

IBC Fall Protection Requirements

2024 IBC Code Section 1015.8 Window Openings

1. Where the bottom of the clear opening of the window is located more than 72 inches (1829 mm) and less than 75 feet (22 860 mm) above the finished grade or other surface below on the exterior of the *building*, the window shall comply with one of the following:

1.1. Operable windows where the openings will not allow a 4-inch-diameter (102 mm) sphere to pass through the opening when the window is in its largest opened position, provided that the opening is not required for emergency escape or rescue.

1.2. Operable windows where the openings are provided with window fall prevention devices that comply with ASTM F2090.

1.3. Operable windows where the openings ~~that~~ are provided with window opening control devices that comply with ASTM F2090. The window opening control device, after operation to release the control device allowing the window to fully open, shall not reduce the minimum net clear opening area of the window unit to less than the area required by Section 1031.3.1 for *emergency escape and rescue openings* .

Where the bottom of the clear opening of the window is located 75 feet (22,860 mm) or more above the finished grade or other surface below on the exterior of the *building* , the window shall comply with one of the following:

Operable windows where the openings are provided with window fall prevention devices that comply with ASTM F2090.

Operable windows where the openings will not allow a 4-inch-diameter (102 mm) sphere to pass through the opening when the window is in its largest opened position.

2.3. Window fall prevention devices that comply with ASTM F2006.

IBC Opening Protection Requirements

If the minimum sill height is not met, one of these options are required:

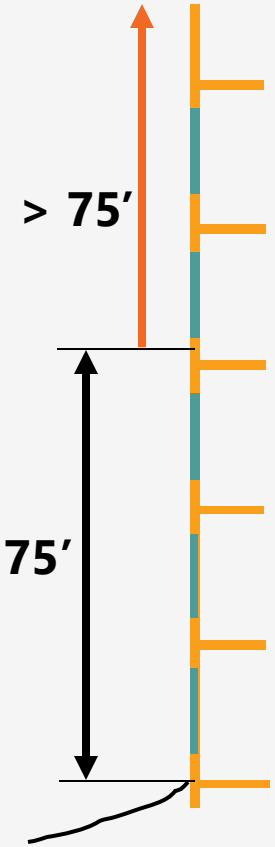
Operable windows where the sill portion of the opening is located more than 75 feet above finished grade may use a window fall prevention device that complies with ASTM F 2006.

ASTM F2006 Compliant:

- **Window Guard**

OR

- **Window Screen (not a standard insect screen)**



Openings that are provided with window fall prevention devices that comply with ASTM F2090.

ASTM F2090 Compliant:

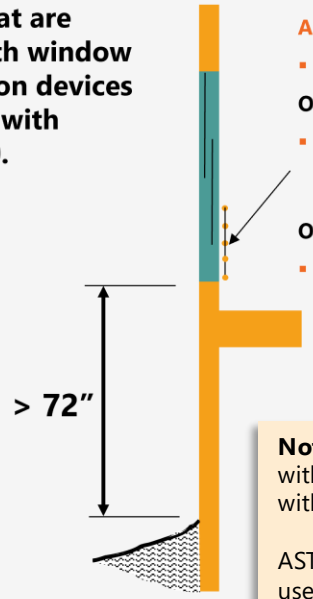
- **Window Guard**

OR

- **Window Screen (not a standard insect screen)**

OR

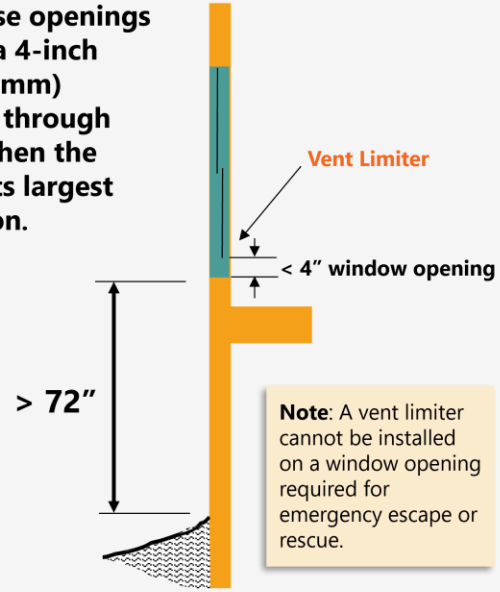
- **Window Opening Control Device (WOCD)**



Note: Openings that are provided with window guards that comply with ASTM F2006 or F2090.

ASTM F2006 devices cannot be used on openings required for emergency escape or rescue.

Windows whose openings will not allow a 4-inch diameter (102 mm) sphere to pass through the opening when the opening is in its largest opened position.



Note: A vent limiter cannot be installed on a window opening required for emergency escape or rescue.

Drawings developed by Andersen for illustration purposes, not found in actual building code.

ASTM F2006: Specification for Window Fall Prevention Devices For Non-emergency Escape (Egress) and Rescue (Ingress) Windows.

Minimum Sill Height Changes by IRC/IBC Version

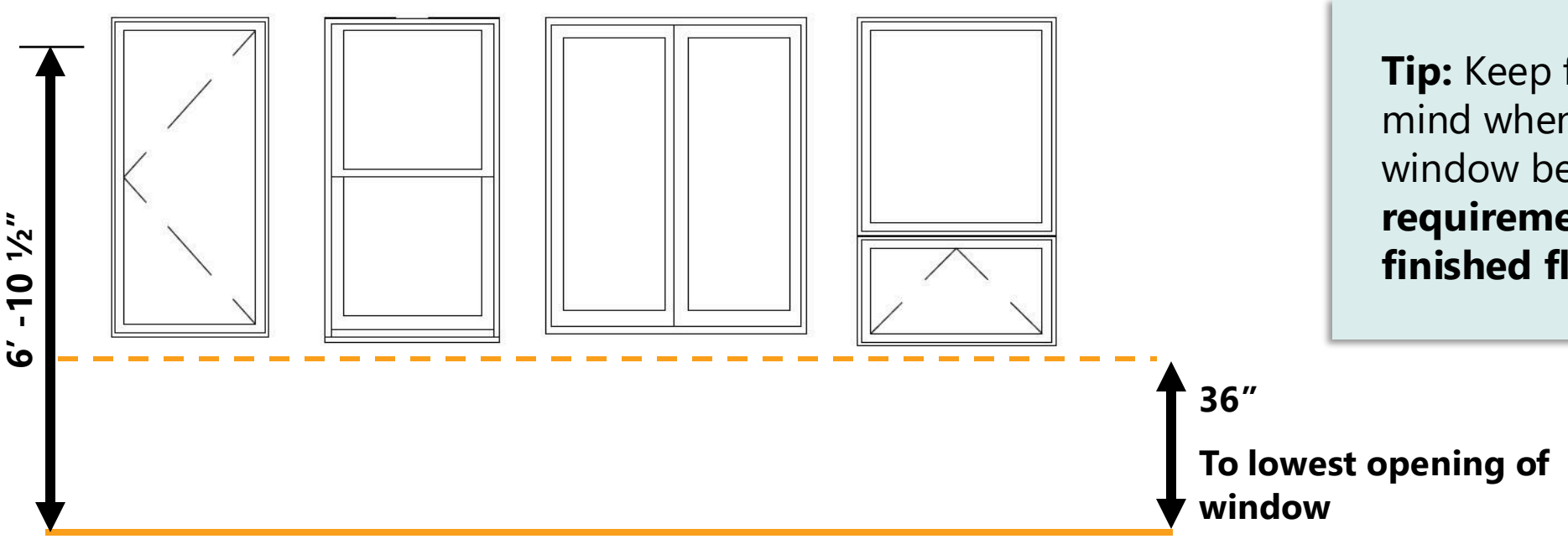
International Residential Code (IRC)						
2006	**2009**	**2012**	**2015**	**2018**	**2021**	**2024**
24 inches	24 inches	24 inches	24 inches	24 inches	24 inches	24 inches

The minimum sill height increased from 24 inches to 36 inches for the IBC starting in 2012.

International Building Code (IBC)						
2006	**2009**	**2012**	**2015**	**2018**	**2021**	**2024**
24 inches	24 inches	**36 inches**	**36 inches**	**36 inches**	**36 inches**	**36 inches**

Always check with the local code official to verify if the window fall protection code requirement has been adopted by your state and if it has been amended.

Windows Above 36”



Tip: Keep finish materials in mind when selecting a window because **sill height requirement is based on finished floor**.

- Units or combinations < 3’-11” not impacted*
- Units or combinations ≥ 3’-11” – 4’-0” depends upon finish flooring*
- Units or combinations > 4’-0” impacted*

*Based upon 6’-10 ½” header height

Window Fall Prevention Devices vs. Limiting Sash Travel

ASTM F2090: Window Fall Prevention Devices with Emergency Escape (Egress) Release Mechanisms

- Approved for windows used for emergency escape and rescue as they are releasable to be able to open the window fully
- Current devices under this standard are window opening control devices (WOCDs), fall prevention window guards and window fall prevention screens

ASTM F2006: Window Fall Prevention Devices For Non-emergency Escape (Egress) and Rescue (Ingress) Windows

- Applicable for windows 75 feet or higher only
- Current devices under this standard are fall prevention window guards and window fall prevention screens
- Not intended for emergency escape and rescue windows
- These devices act as barriers

Vent Limiter Hardware: Excluded from scope of ASTM F2090 and F2006

- Not for use on emergency escape and rescue windows
- Requires tool or special knowledge to override or release
- No applicable test standards as the code allows a sash limited to a less than four-inch opening as an allowable exception to the minimum sill height

Window Fall Protection Devices

ASTM F2090

- Standard specification for window fall prevention devices with emergency escape (egress) release mechanisms
- **Examples**: Window Opening Control Devices (WOCD's), window guards, or special screens (i.e. not a typical insect screen)

Window Guard: If releasable.

Window Opening Control Device (WOCD): single-action device example shown, needs two per window.

ASTM F2006

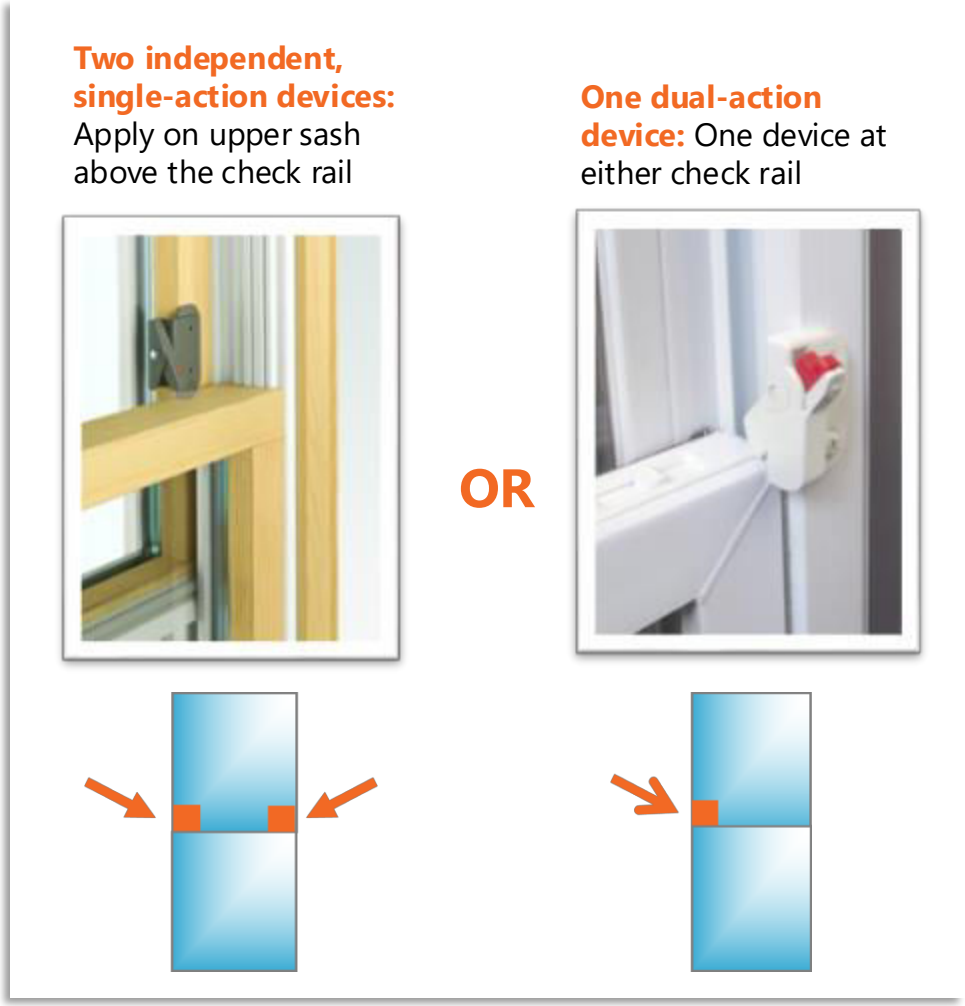
- Standard safety specification for window fall prevention devices for non-emergency escape (egress) and rescue (ingress) Windows
- Are intended for **applications 75 feet and above** which is the limitation of a fire rescue ladder.
- **Examples**: Window guards, unique screen type (i.e. not a typical insect screen)

Fixed Window Guard: Non-releasable.

Window Opening Control Device (WOCD)

Complying with ASTM F2090, a WOCD is a device that, when installed properly:

- Limits the sash opening to a less than 4-inch dimension
- Can be deactivated by either two independent single action devices or one dual action device
- Allows the sash to be fully opened as may be needed for escape and rescue
- Automatically re-engages when the sash is closed such that the sash will again stop at a less than 4-inch opening dimension

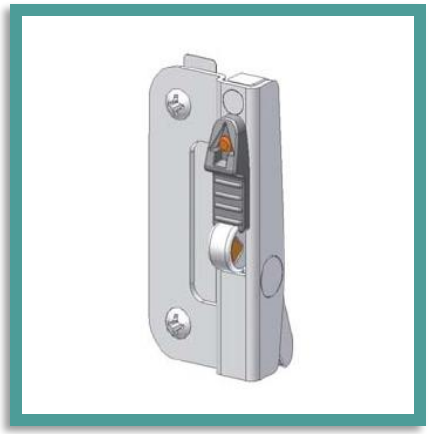


WOCD Examples

Dual-Action Device

Single-Action Device

Hung Window



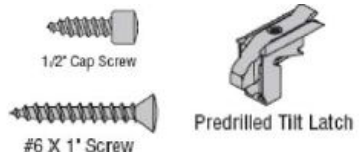
Casement Window

Gliding Window

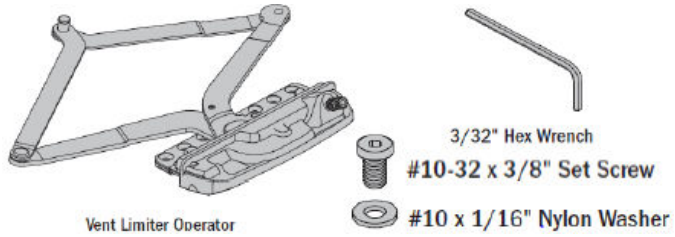
Vent Limit Devices

- Vent limiters are devices that are applied to a window/sash that limit the opening of the window
- Limits sash opening to a less than 4-inch opening
- May be accepted by a local code official as an exception to the sill height code provided it is not installed on a window opening required for emergency escape and rescue
  - Not all vent limiters limit a sash to a less than four-inch opening; check with manufacturer
- Requires a tool or special knowledge to disengage
  - Not to be placed on a required emergency escape and rescue opening
  - Not commonly used in residential applications
- **Not included in the scope of either ASTM F2090 or F2006**

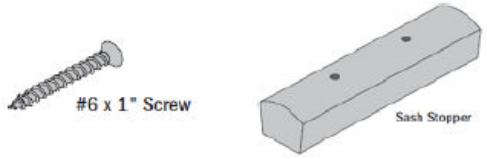
Hung Window

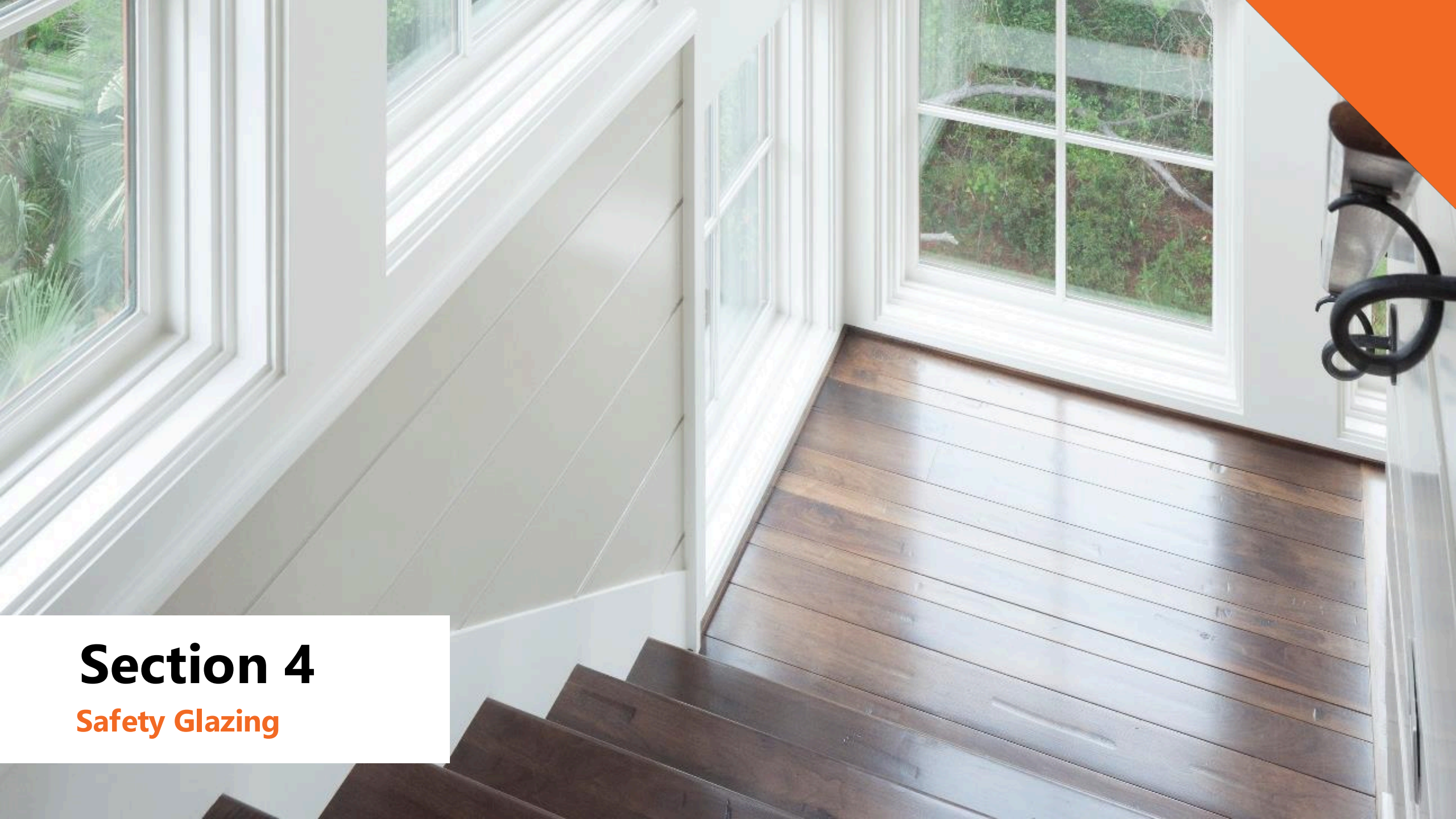


Casement



Gliding Window





Section 4

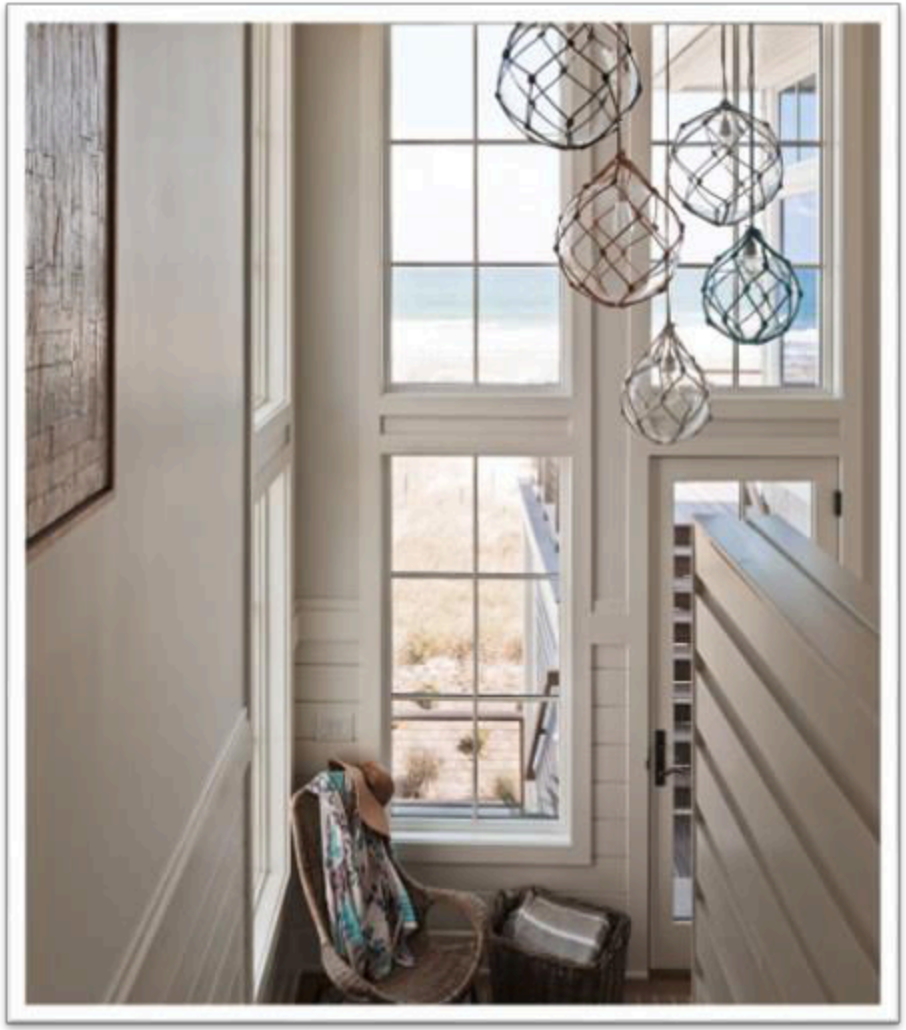
Safety Glazing

Safety Glazing

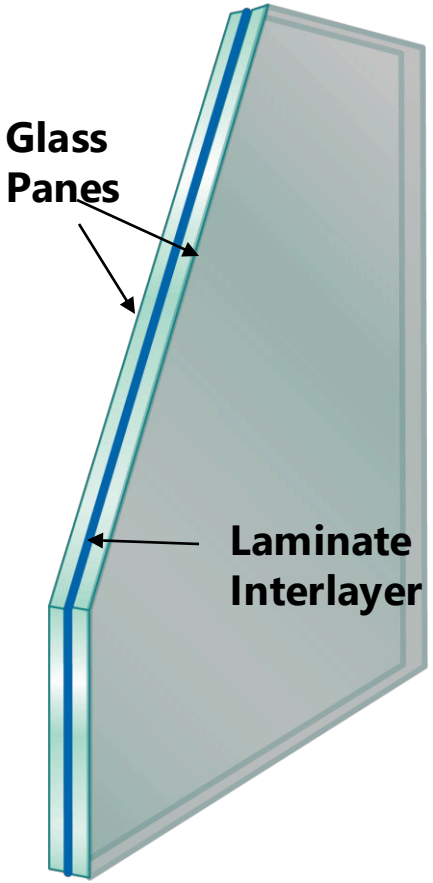
- In 1977, the Consumer Product Safety Commission (CPSC) enacted requirements under the Consumer Product Safety Act
- Purpose is to prevent serious injury where a person could fall into the glass

Safety glazing test standards referenced in the code: CPSC 16 CFR 1201 Parts I and II, ANSI Z 97.1 - 2014

- Glazing materials so constructed, treated or combined with other materials that, if broken by human contact, the likelihood and/or severity of cutting and piercing injuries that might result from such contact is minimized.
- There are tables in the code that define the use and levels of these two safety glazing test standards

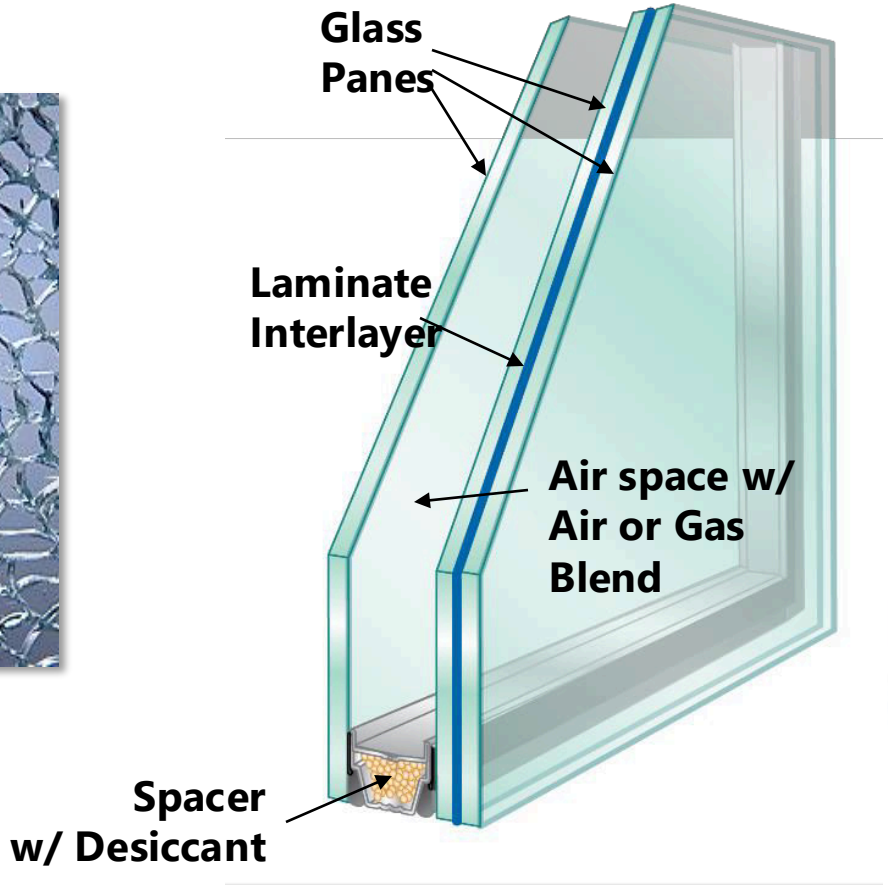


Types of Safety Glazing



Laminated Glass

Tempered Glass



Safety Insulated Glass

Plastic Glazing

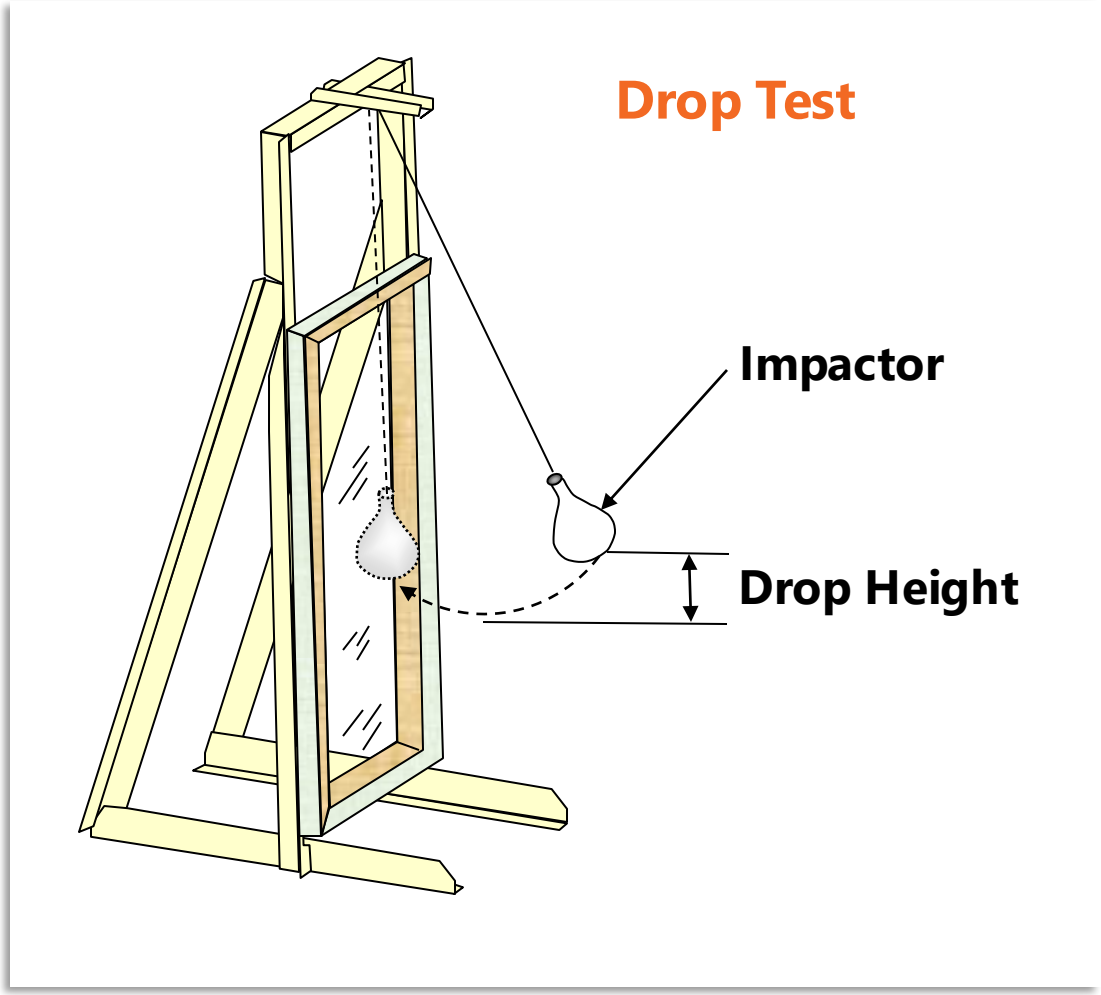
Standards and Test Requirements

CPSC 16 CFR 1201

- **Category I**: Doors with glass <9 SF
  - 18″ Drop Test
- **Category II:** Doors and other locations subject to human impact
  - 48″ Drop Test

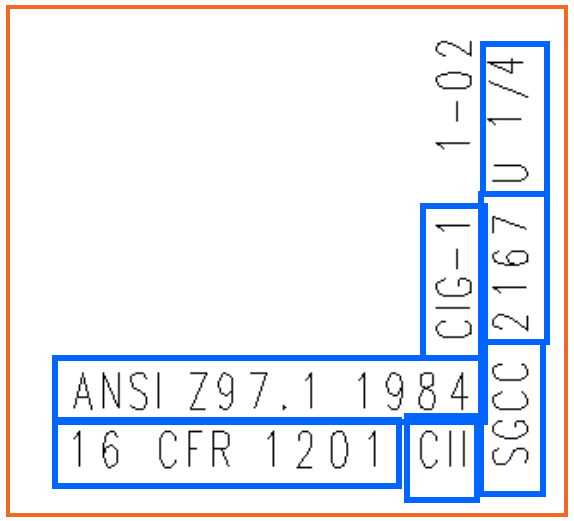
ANSI Z 97.1 – 2014 Edition

- **Limited:** If manufactured to sizes <34″ x 76″
- **Unlimited:** If manufactured to sizes ≥ 34″ x 76″
  - 12″, 18″, 48″ Drop Test

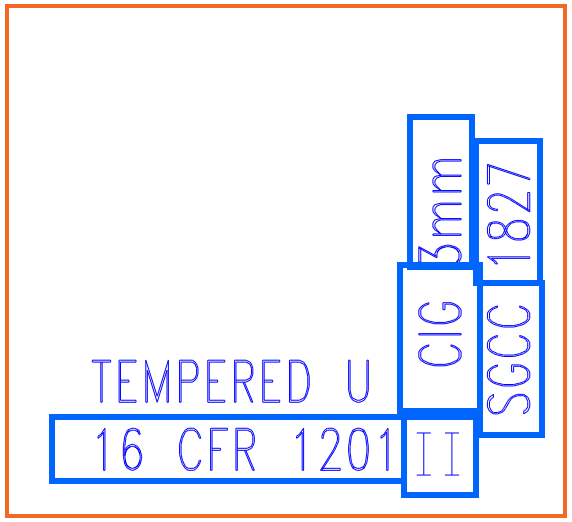


Labeling Requirements

Glass must be permanently labeled.



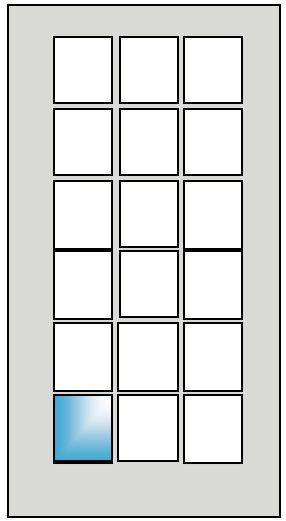
Laminated Glass Label

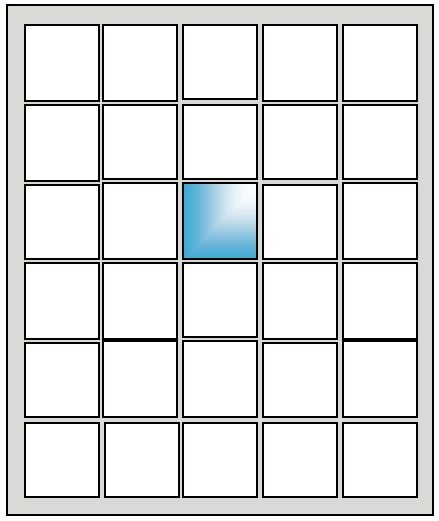


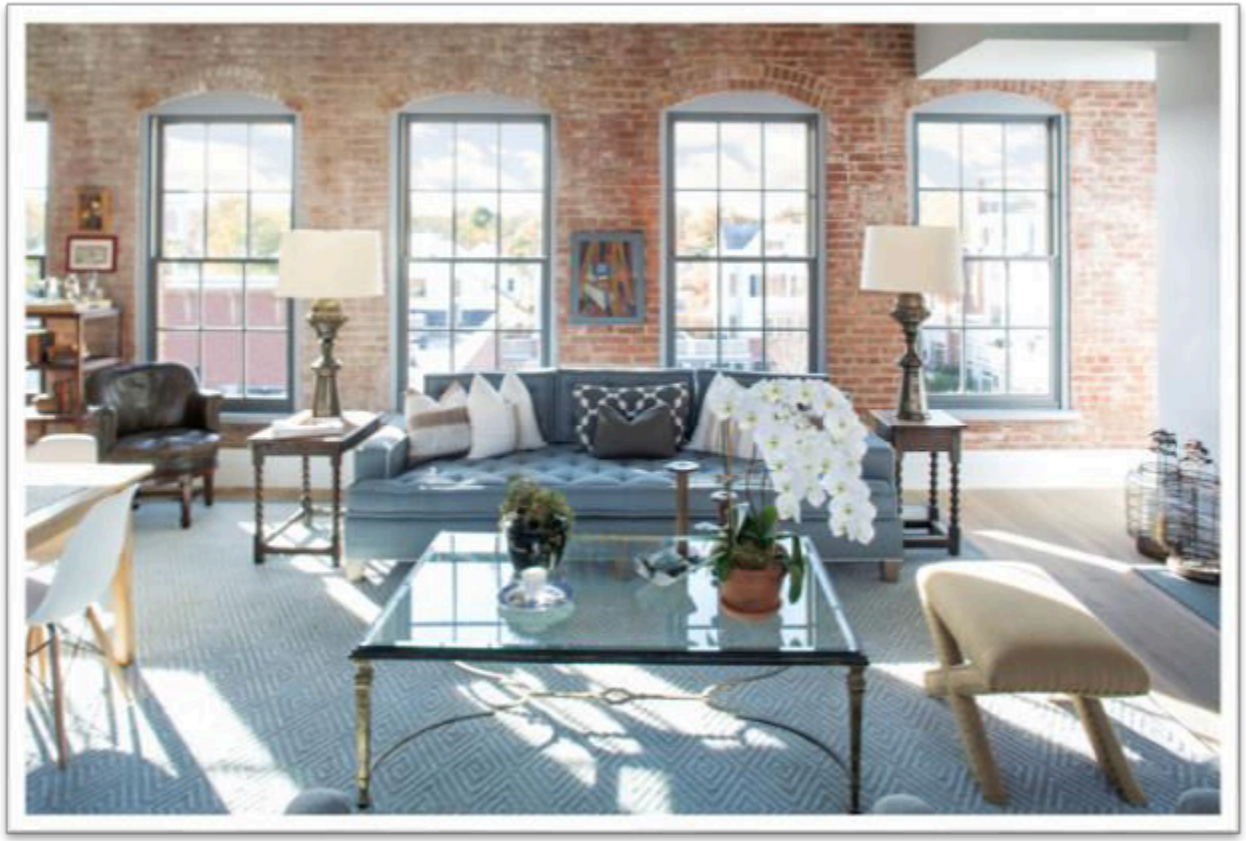
Tempered Glass Label

Labeling Requirements for Multi-Pane Windows

- Multi-pane assemblies **require only one pane to have full label** if individual panes do not exceed 1 square foot
- All other panes in the assembly need to be permanently marked with **“16 CFR 1201”**







IRC 2024 Project Scenario: New Patio Door and Windows

- Remodel of home built in 1997
- Owner wants to expand access and views of the garden
- You want to specify French hinged outswing patio doors
- You want to add one sidelight to both sides of the door

Which of the three products will require safety glazing?

DOORS ONLY OR **DOORS AND ONE SIDELIGHT** OR **DOORS AND BOTH SIDELIGHTS** OR **NONE**

Always check with the local code official or other authorities for guidance specific to your project.

IRC 2024 Project Scenario: New Patio Door and Windows

- Remodel of home built in 1997
- Owner wants to expand access and views of the garden
- You want to specify French hinged outswing patio doors
- You want to add one sidelight to both sides of the door

Which of the three products will require safety glazing?

DOORS AND BOTH SIDELIGHTS → **Key hazardous areas**

Always check with the local code official or other authorities for guidance specific to your project.

Key Hazardous Locations

Glazing in or around…

- Doors
- Windows adjacent to doors
- Guards and railings (not covered in this presentation)
- Wet surfaces (e.g., pools, bathroom)
- Stairways and ramps
- Bottom stairway landing

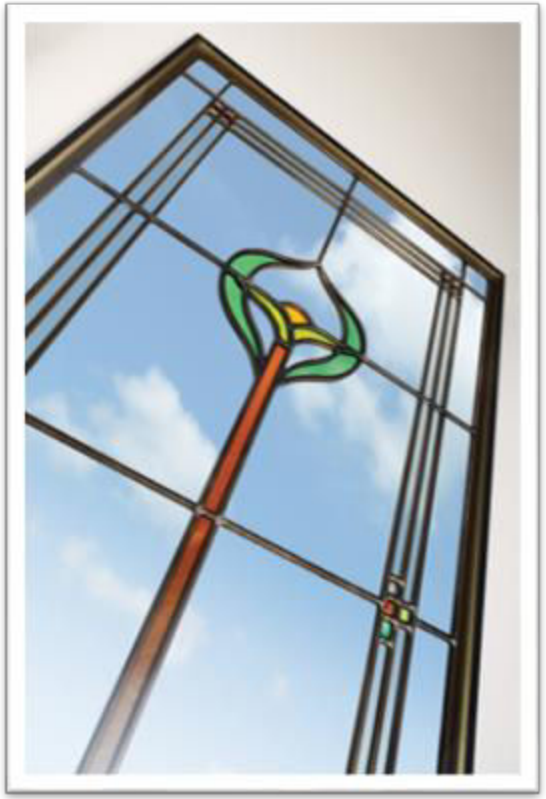
Glazing in Doors

Glazing in all fixed and operable panels of swinging, sliding and bifold doors shall be considered to be a hazardous location.*

Exceptions

1. Glazed openings of a size through which a 3-inch-diameter (76 mm) sphere is unable to pass.
2. Decorative glazing.
3. Glazing materials used as curved glazed panels in revolving doors.
4. Commercial refrigerated cabinet glazed doors.

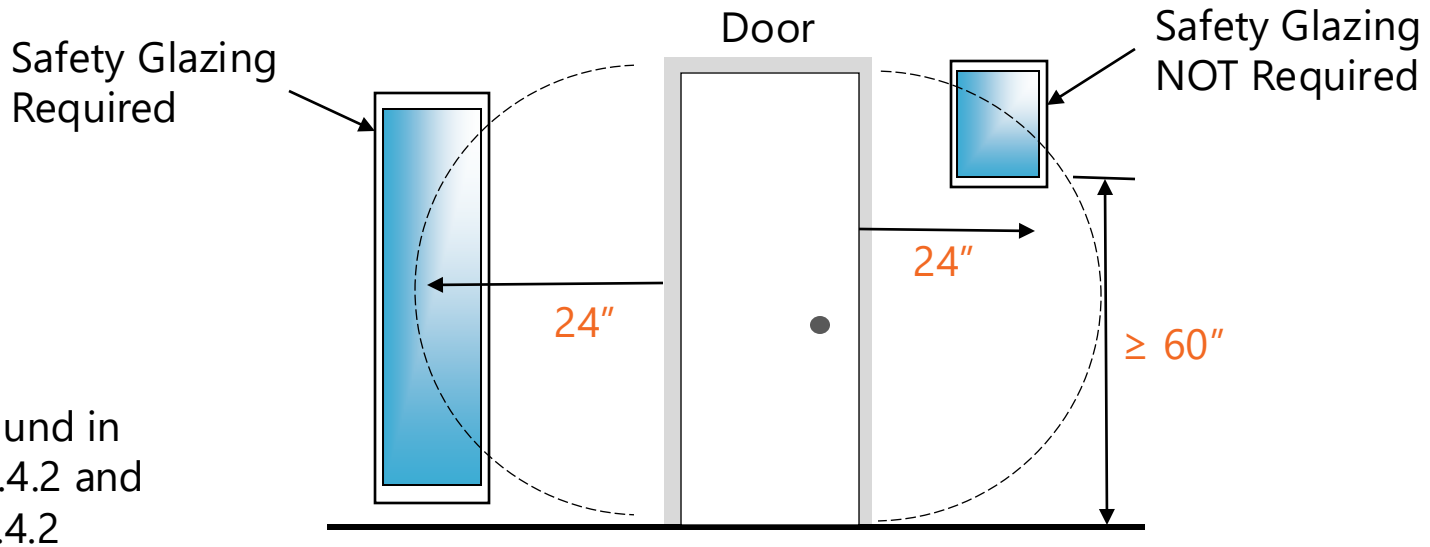
Note: Exceptions 3 and 4 are in the IBC only.



*Common language found in 2024 IRC Section R324.4.2 and 2024 IBC Section 2406.4.1

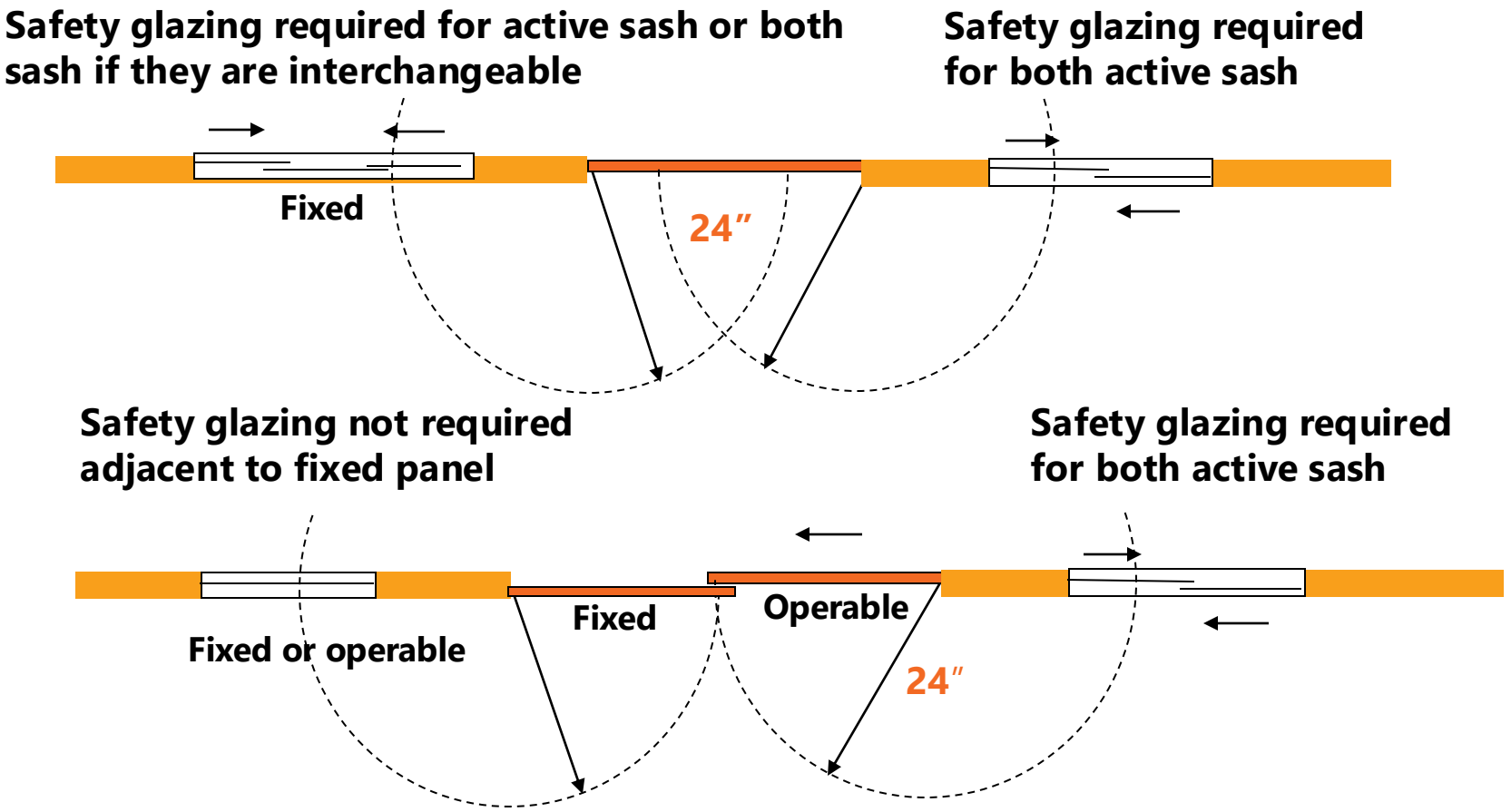
Glazing Adjacent to Doors

Glazing in individual fixed or operable panels adjacent to a door where the nearest exposed edge of the glazing is within a 24" arc of either vertical edge of the door in a closed position and where the bottom exposed edge of the glazing is less than 60” above the walking surface.*



*Common language found in
2024 IRC Section R324.4.2 and
2024 IBC Section 2406.4.2

Glazing Adjacent to Doors

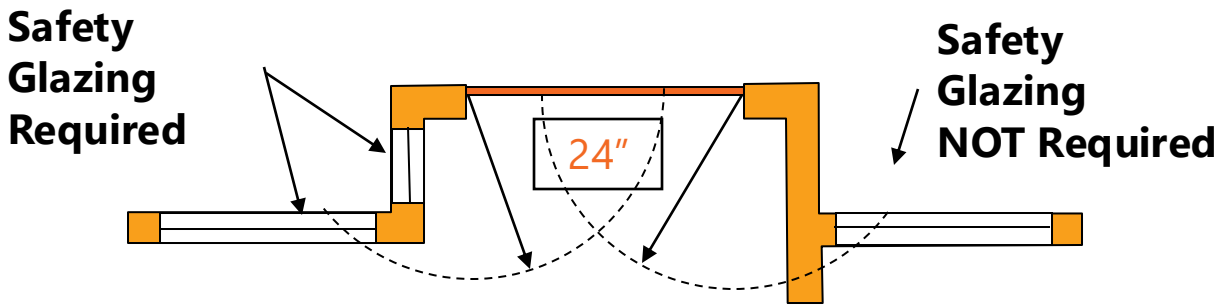


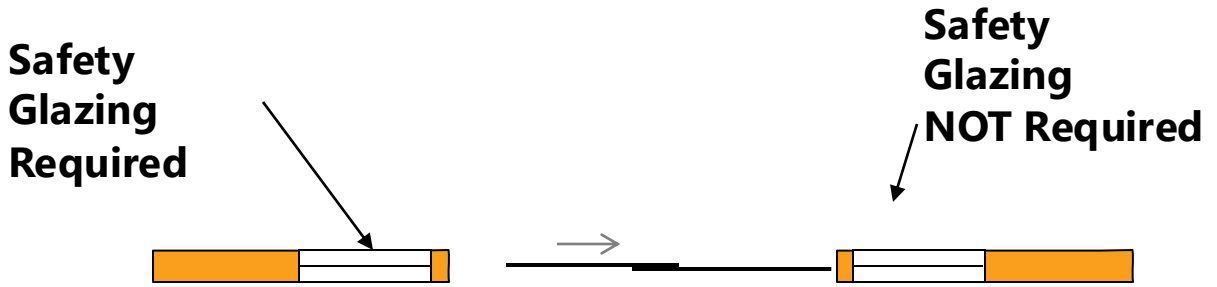
Glazing Adjacent to Doors: IRC Exceptions

IRC Exceptions

1. Decorative glazing
2. Intervening walls or permanent barriers between the door and the glazing
3. Where access thru the door is to a closet or storage area ≤ 3 feet in depth (glazing may still be subject to window safety glazing requirements)
4. Glazing that is adjacent to the fixed panel of patio doors

Note: Exception 4 is unique to the IRC.



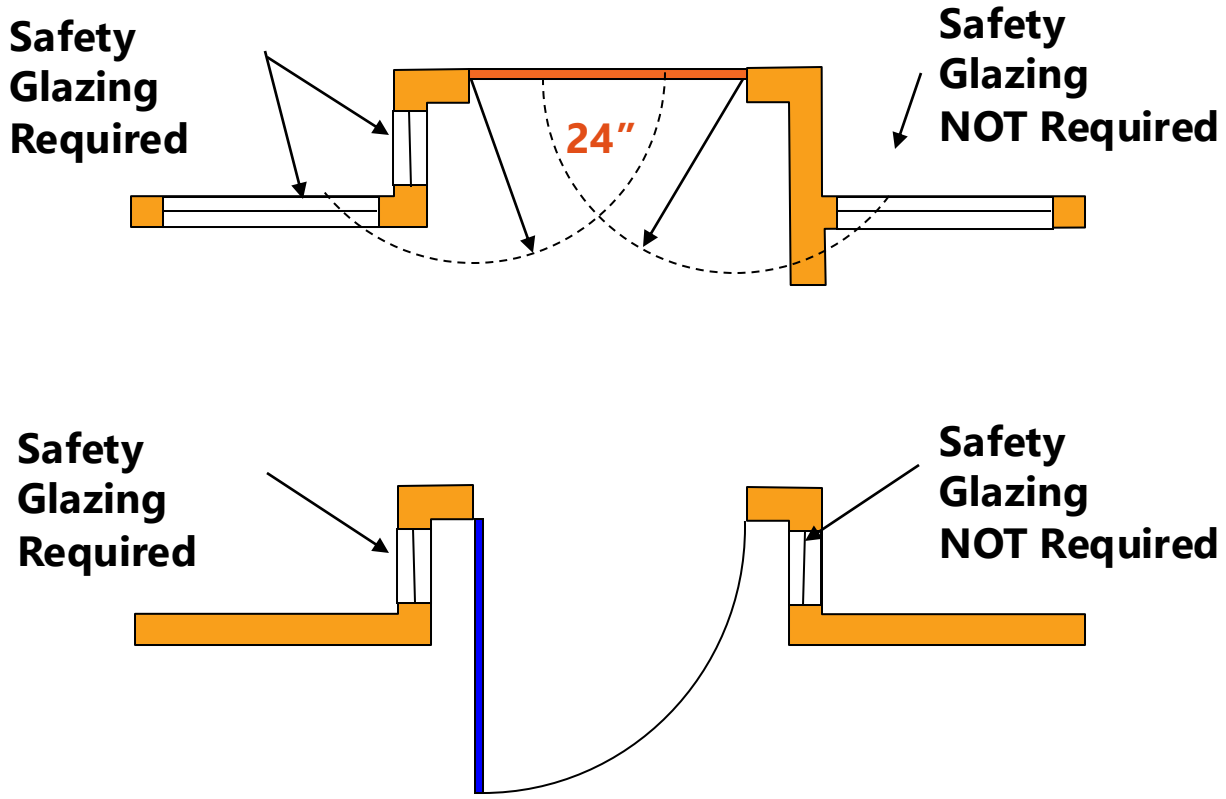


Glazing Adjacent to Doors: IBC Exceptions

IBC Exceptions

Same as IRC except for number 4…

4. **Glazing in walls on the latch side of and perpendicular to the plane of the door in a closed position in 1 & 2 family dwellings or within dwelling units in Group R-2**

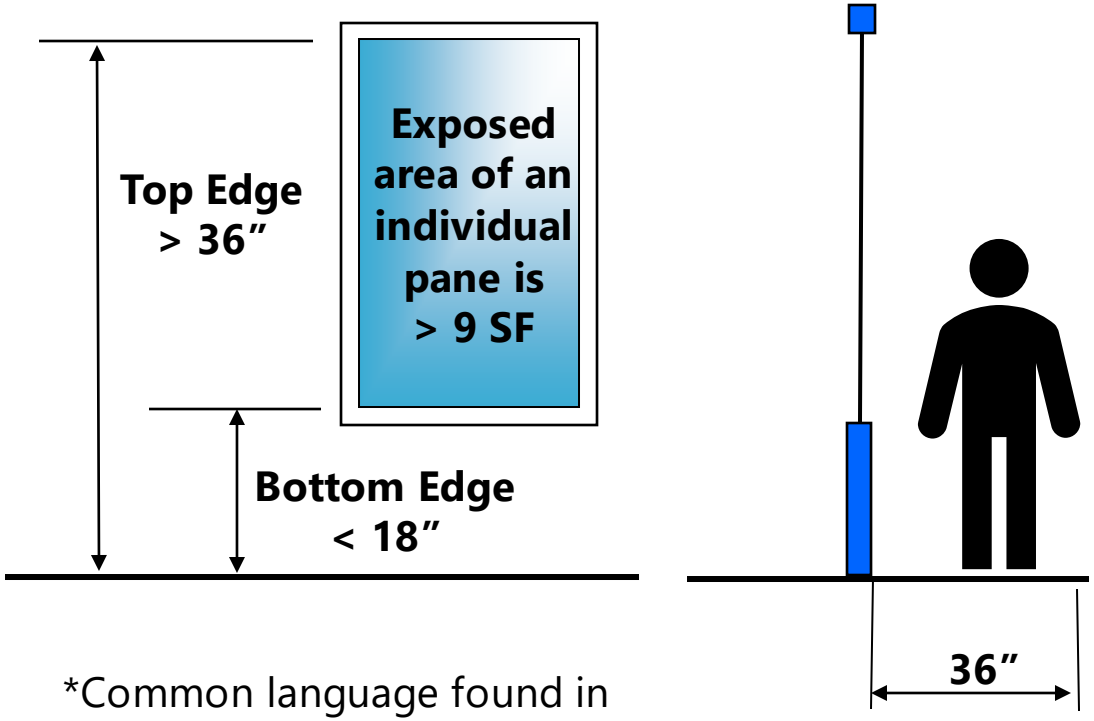


Glazing in Windows

Glazing in an individual fixed or operable panel which meets all of the following conditions shall be considered to be in a hazardous location*

1. The exposed area of an individual pane is larger than 9 square feet (0.836 m^2)
2. The bottom edge of the glazing is less than 18 inches (457 mm) above the floor or adjacent walking surface.
3. The top edge of the glazing is more than 36 inches (914 mm) above the floor or adjacent walking surface.
4. One or more walking surfaces are within 36 inches (914 mm), measured horizontally and in a straight line, of the glazing.

Note: New text in the 2024 IBC only.



*Common language found in 2024 IRC Section R324.4.3 and 2024 IBC Section 2406.4.3

Glazing in Windows: Exceptions to IBC and IRC

IBC and IRC Exceptions

1. Decorative glazing

2. Installation of a horizontal rail on the accessible side of the glazing 34 to 38 inches above the walking surface. The rail must be able to withstand a horizontal load of 50 pounds per linear foot without contacting the glass and have a cross-sectional height of not less than 1 - 1/2 inches

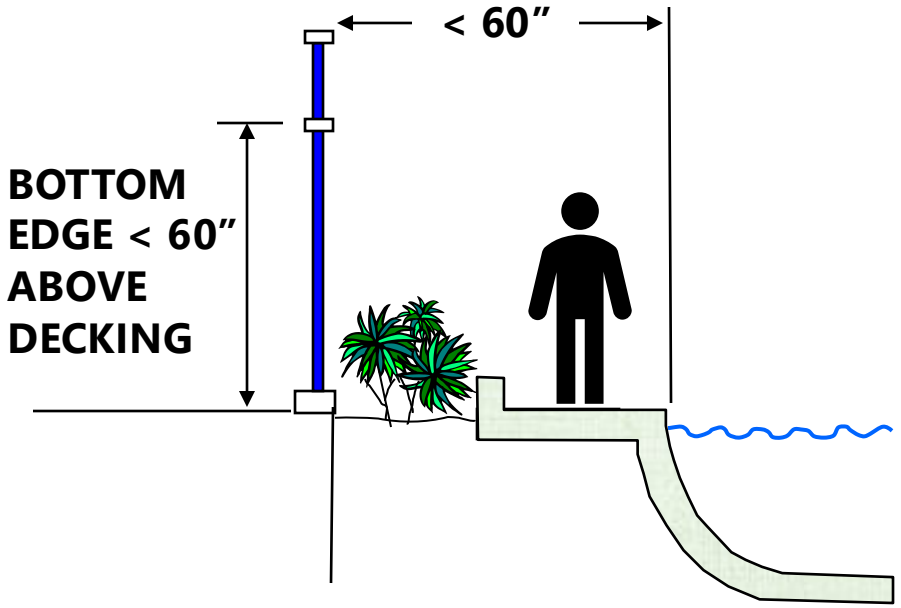
Exception 3 in the 2024 IRC: Outboard panes in insulating glass units and other multiple glazed units where the bottom edge of the glass is 25 feet or more above grade, a roof, walking surfaces or other horizontal surface adjacent to the glass surface

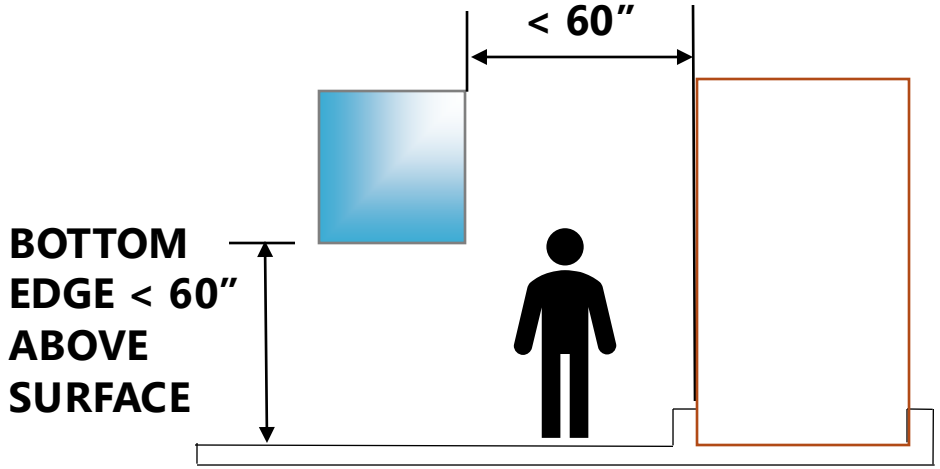
Exception 3 in the 2024 IBC: Outboard panes in insulating glass units or multiple glazing where the bottom exposed edge of the glass is ~~25 feet (7620 mm)~~ 8 feet (2438 mm) or more above any grade~~, roof~~, or walking surface~~ or other horizontal or sloped (within 45 degrees of horizontal) (0.79 rad) surface~~ adjacent to the glass exterior.

New for 2024 IBC.

Glazing and Wet Surfaces

Glazing in walls, enclosures or fences containing or facing hot tubs, spas, whirlpools, saunas, steam rooms, bathtubs, showers and indoor or outdoor swimming pools where all of the following conditions are present*





Exception

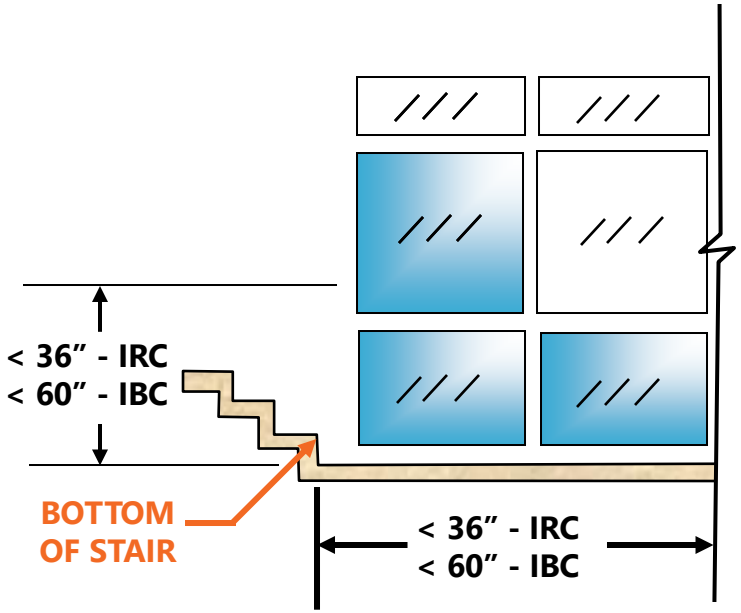
Glazing that is not more than 60 inches measured horizontally and in a straight line from the waters edge of a bathtub, hot tub, spa, whirlpool or swimming pool.

*Common language found in 2024 IRC Section R324.4.5 and 2024 IBC Section 2406.4.5

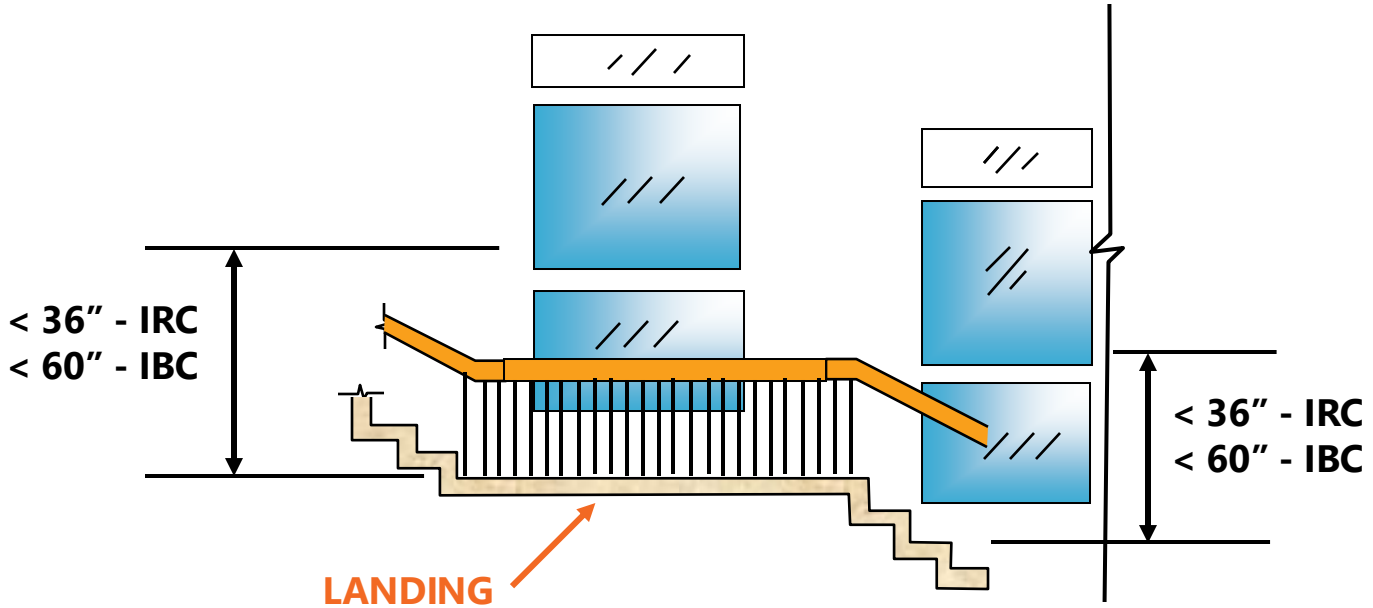
Glazing Adjacent to Stairways and Ramps

SAFETY GLAZING

Glazing where the bottom exposed edge of the glazing is less than 36 inches (IRC) or 60 inches (IBC) above a plane of the adjacent walking surface of stairways, landings between flights of stairs and ramps*



~~R308.4.6~~ R324.4.6 Glazing adjacent to stairs and ramps. Glazing installed where the bottom exposed edge of the glazing is less than 36 inches (914 mm) above the plane of the adjacent walking surface of *flights* of stairs, ramp runs ~~*stairways*~~ , landings between *flights* of stairs and landings between ramp runs ~~*ramps*~~ shall be considered to be in a *hazardous location*.



2406.4.6 Glazing adjacent to stairways and *ramps*. Glazing where the bottom exposed edge of the glazing is less than 60 inches (1524 mm) above the plane of the adjacent walking surface of *stairways*, landings between flights of *stairs* and ramps shall be considered to be a hazardous location.

Note: Strikeout and blue text indicate items updated for 2024.

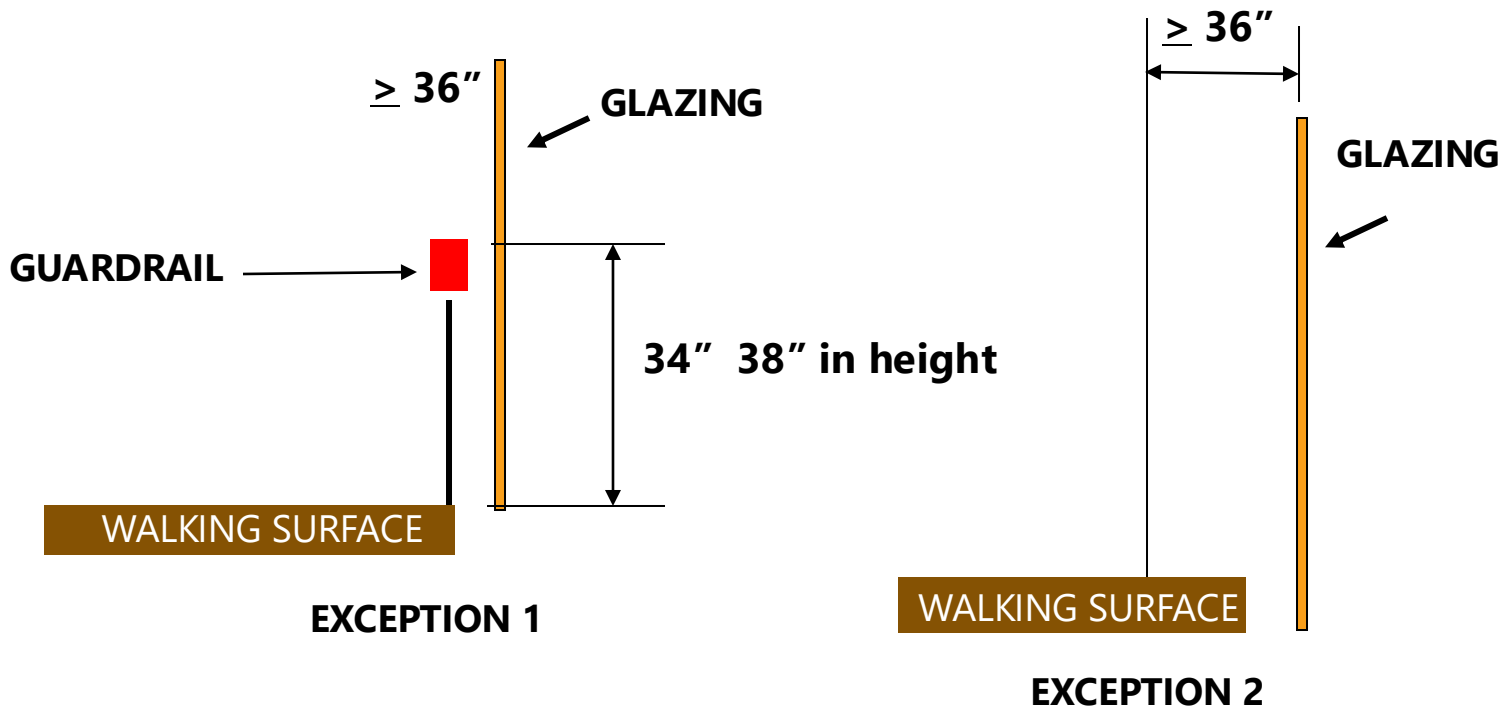
*Common language found in 2024 IRC Section R308.4.6 and 2024 IBC Section 2406.4.6

Glazing Adjacent to Stairways and Ramps: IRC Exceptions

IRC Exceptions

1. Where glazing is adjacent to a walking surface and a horizontal rail is installed at 34 to 38 inches (864 to 965 mm) above the walking surface. The rail shall be capable of withstanding a horizontal load of 50 pounds per linear foot (730 N/m) without contacting the glass and have a cross-sectional height of not less than 1 1/2 inches (38 mm)

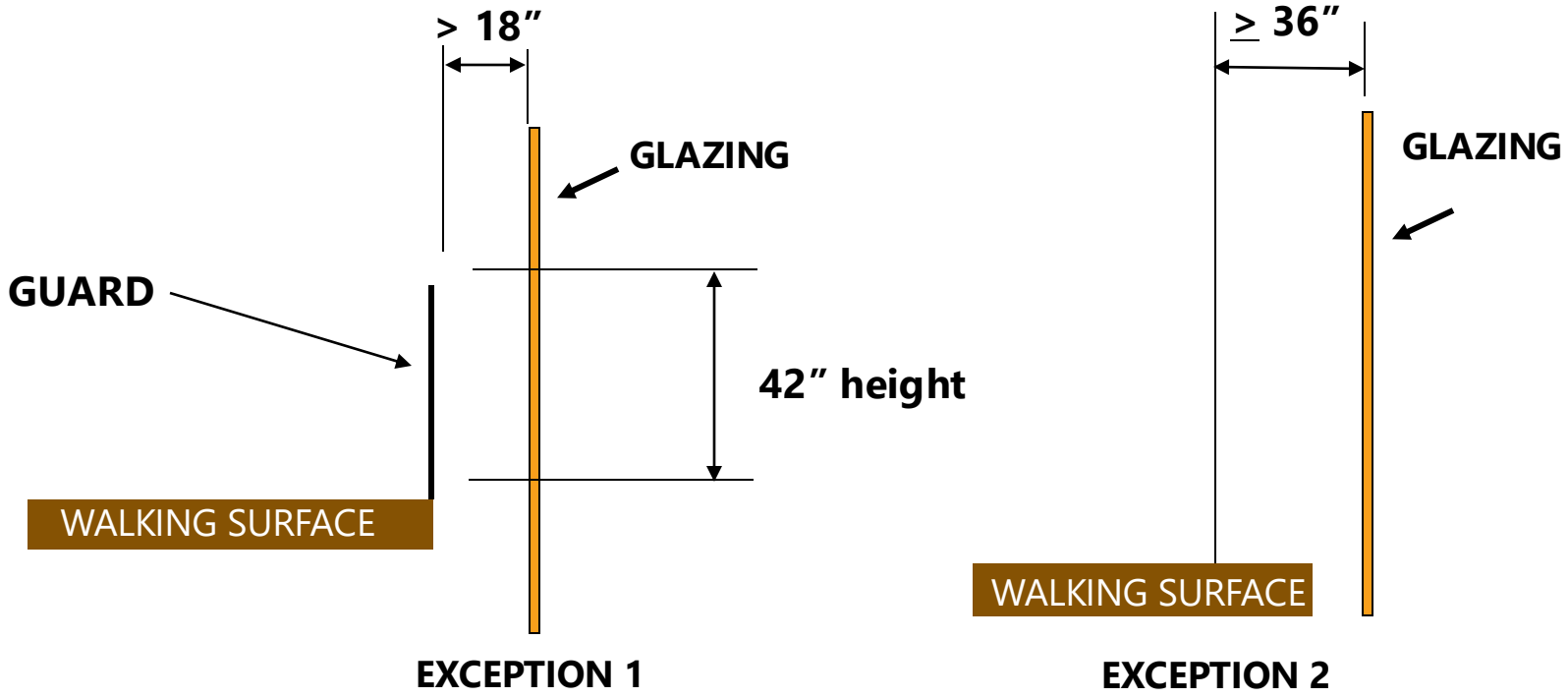
2. Glazing 36 inches (914 mm) or more horizontally from the walking surface



Glazing Adjacent to Stairways and Ramps: IBC Exceptions

IBC Exceptions

1. The side of a *stairway*, landing or *ramp* that has a *guard* complying with the provisions of Sections 1015 and 1607.9, and the plane of the glass is greater than 18 inches (457 mm) from the railing.
2. Glazing 36 inches (914 mm) or more measured horizontally from the walking surface.



Glazing Adjacent to Stairway Landing

2024 IRC Section 324.4.7

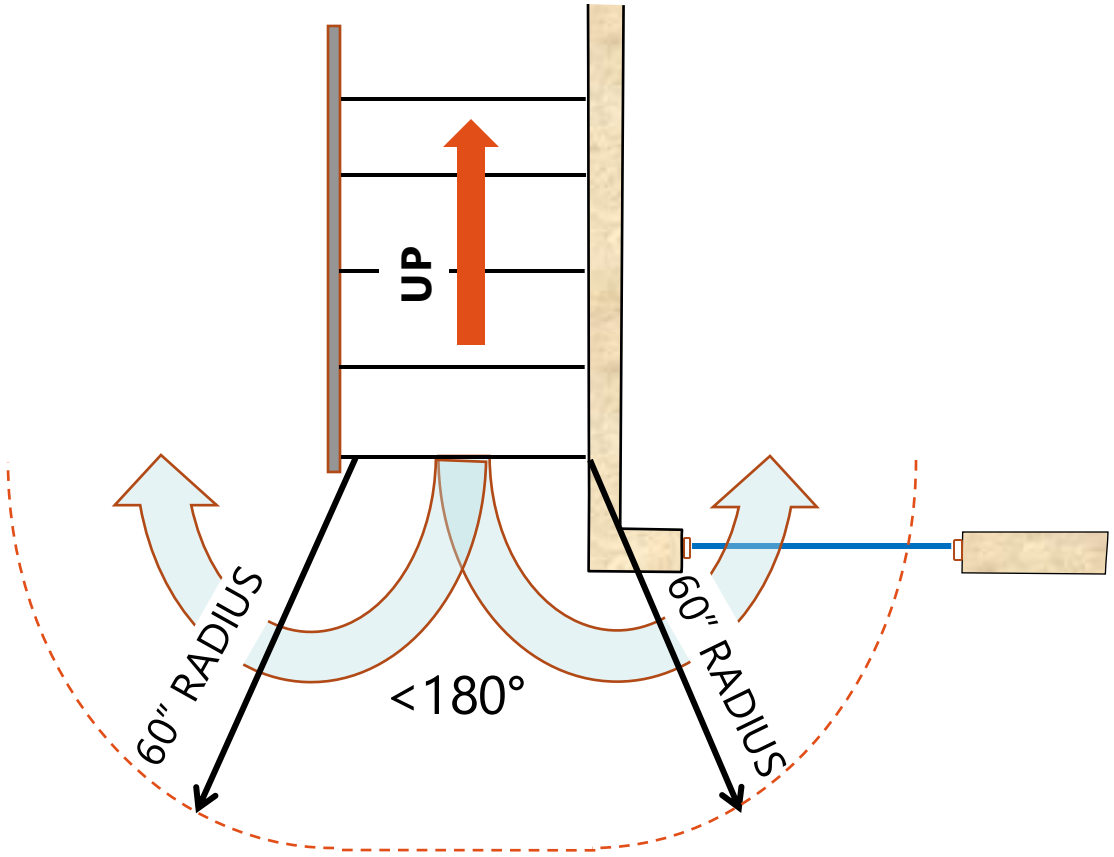
Glazing adjacent to the bottom stair landing

Glazing adjacent to the bottom landing of a stairway where the glazing is less than 36" above the landing and within a 60" horizontal arc that is less than 180 degrees from the bottom tread nosing shall be considered a hazardous location

2024 IBC Section 2406.4.7

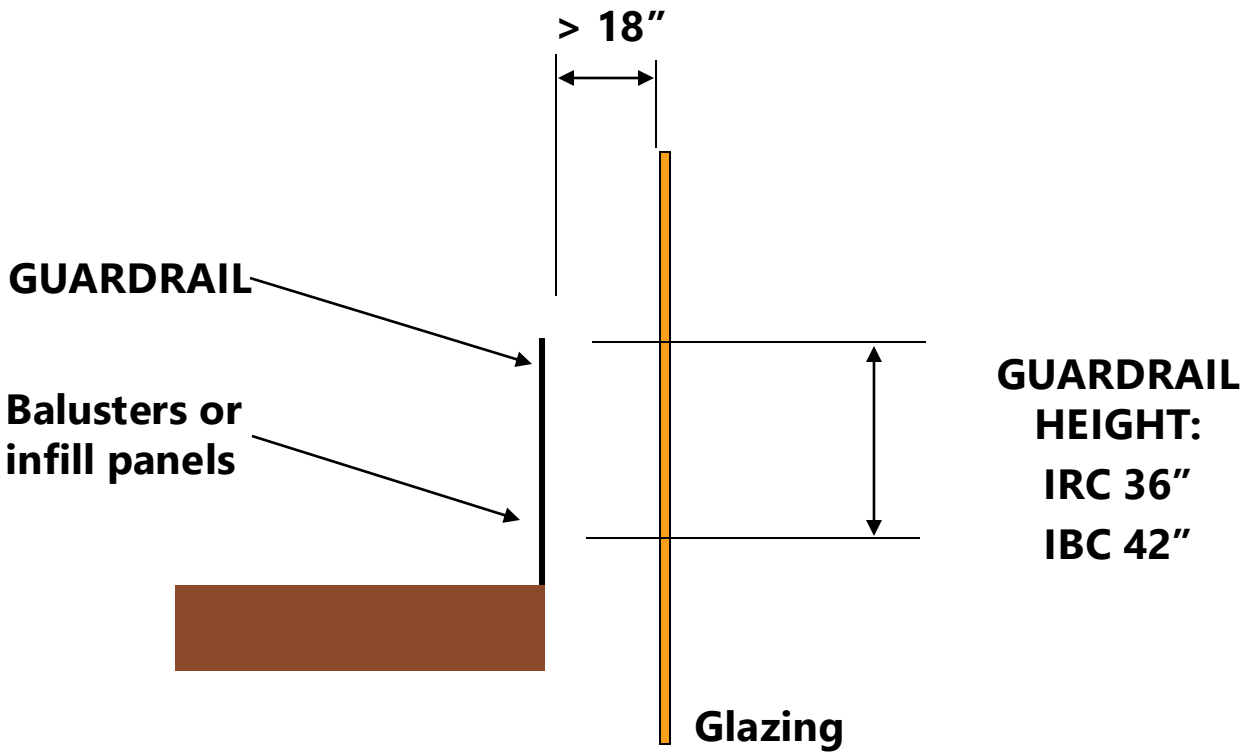
Glazing adjacent to the bottom stairway landing

Glazing adjacent to the bottom landing of a stairway where the glazing is less than 60" above the landing and within a 60" horizontal arc that is less than 180 degrees from the bottom tread nosing shall be considered a hazardous location



Glazing Adjacent to Stairway Landing: Exceptions

Exception
Pane of the glass is protected by a guard* and the glass is more than 18 inches from the guard

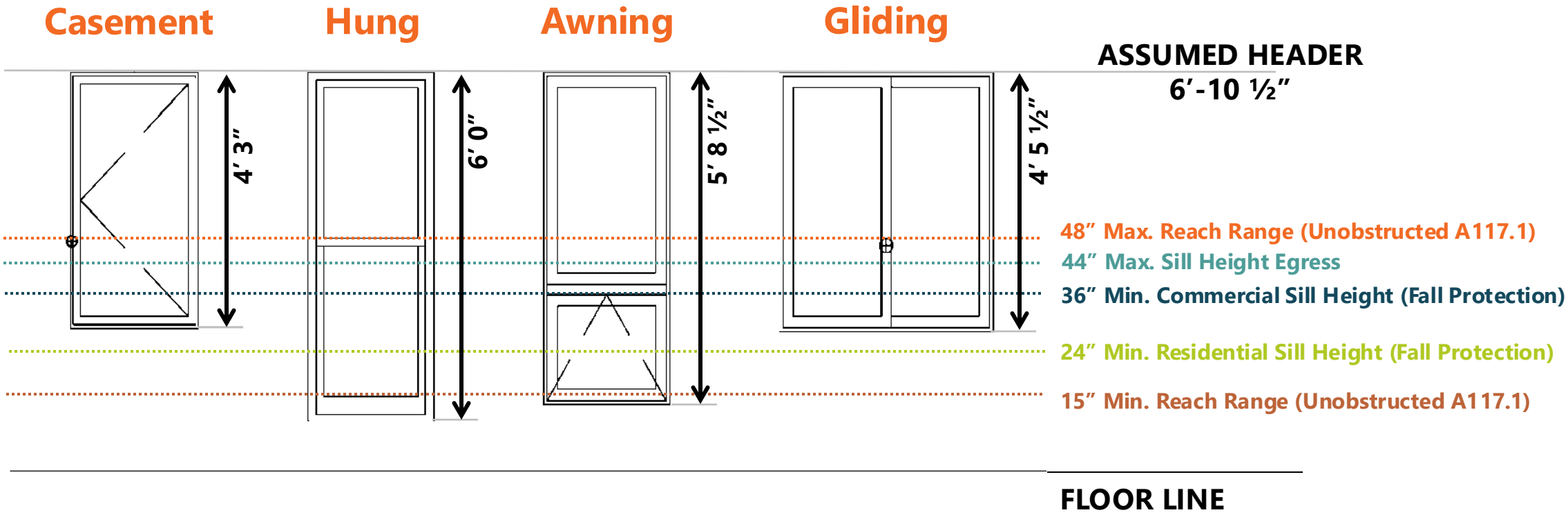


* Complying with IRC Section R321 (guards), or IBC Sections 1015 (guards) and 1607.9 (loads on handrails, guards, grab bars and seats)

Wrap Up

Window Code Fundamentals

Putting it Together



Key Takeaways

- Reach range can vary based on potential obstructions according to accessibility requirements
- The minimum net clear opening width and height for window requirements for emergency escape and rescue do not equate to the minimum overall square footage requirements
- Multiple methods of compliance exist for fall prevention, but pay attention to the options allowed if the opening is required for Emergency Escape and Rescue
- Many situations require safety glazing, so pay attention to all locations and verify all requirements with the local code official

THANK YOU!